# MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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## INTRODUCTION.

The MONTHLY WEATHER REVIEW for August, 1898, is based on about 2,940 reports from stations occupied by regular and voluntary observers, classified as follows: 147 from Weather Bureau stations; numerous special river stations; 32 from post surgeons, received through the Surgeon General, United States Army; 2,583 from voluntary observers; 96 received through the Southern Pacific Railway Company; 29 from Life-Saving stations, received through the Superintendent United States Life-Saving Service; 31 from Canadian stations; 20 from Mexican stations; 7 from Jamaica, W. I. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Dr. Mariano Bárcena, Director of the Central Meteorological and Magnetic Observatory of Mexico; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; and Commander J. E. Craig, Hydrographer, United States Navy.

The REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to generally conform to the modern international system of standard meridians, one hour apart, beginning with Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local meridian is mentioned.

## FORECASTS AND WARNINGS.

By Prof. F. H. BIGELOW, in charge of Forecast Division.

### WIND SIGNALS.

No storm signals were ordered on the Pacific coast and the Great Lakes during August, 1898, and no severe wind storms appeared during the month in the West Indies or over the Caribbean Sea.

Two rather severe storms visited the southeastern coasts of the United States, one passing over western Florida the night of the 2–3d, and the other crossing the Georgia and southern South Carolina coasts the night of the 30th–31st.

The Florida storm first appeared as a feeble disturbance near Jupiter the night of the 1st, and passed thence northwestward to the vicinity of Tampa by the morning of the 2d. Anticipating a development of strength on the part of this disturbance information signals were ordered on the Florida, Alabama, and Louisiana coasts the morning of the 2d, and interests in those sections were telegraphed that "a storm appears to be developing in the east Gulf." That the signals and warnings were warranted and timely is shown by the following report of Mr. A. J. Mitchell, Observer and Section Director, Weather Bureau, Jacksonville, Fla.:

> The storm approached the coast in the vicinity of St. Josephs Bay during the evening of the 2d. No marked premonition of an existing disturbance was observed during the early hours of the day. The wind velocity gradually increased from about 8 p. m. of the 2d and continued until 3 or 4 a. m. of the 3d. Near the coast the maximum wind was felt about 2 a. m. from the southeast. The storm track was about 60 miles wide and embraced mainly the section of country between the Choctawhatchee and Apalachicola rivers. Throughout this section great damage was done to crops, turpentine farms, and other property. Three barges, four tug boats, several pile drivers, and a number of sailing craft were sunk, and wharves and dwellings were damaged. The inland progress of the storm was characterized by diminishing force, and the disturbance was practically dissipated before it reached the Alabama line.

During August 27, 28, and 29, a feeble disturbance drifted eastward over the Gulf of Mexico, and on the morning of the 30th there were premonitory signs of a storm formation off the south Atlantic coast. The regular morning and special reports of the 30th located the point of the storm's inception off, and not far distant from, the Georgia coast; although these reports did not indicate the hurricane intensity of the storm over the very limited area it covered, northeast storm signals were ordered, and storm warnings were telegraphed to south Atlantic ports from Jacksonville, Fla., to Norfolk, Va., and the Chief of Bureau of Navigation, Navy Department, was notified of the threatening conditions in that section, during the afternoon of the 30th, twelve hours before the storm center reached the coast line. The greatest wind force was apparently experienced at Tybee Island, where a velocity of 84 miles per hour was recorded about 4:30 a. m. of the 31st. In addition to destruction and damage by wind heavy losses were caused by torrential rains and floods along the Georgia coast, and to river plantations between Augusta and Savannah. The territory ravaged by this storm was confined to Savannah and vicinity, and the following extract from the report of the observer at that point indicates the general

character of the storm. It will be observed that the lowest barometer reading, 29.23, occurred at 4:30 a. m., indicating that at that time the center of the storm passed over that city:

30th.—Wind fresh from north to northeast during the morning with a shower and slowly falling barometer; thunder, with very heavy rain in the afternoon, with a northeast wind squall of 34 miles per hour. As the afternoon advanced the general conditions became threatening and the wind began to show a backing tendency to the northwest. The barometer fell slowly during the evening until 10 p. m., when a very rapid decline began, with wind increasing from the northwest. At midnight the wind velocity had risen to 45 miles per hour from the northwest and the barometer had fallen to 29.73.

31st.—Until 3:30 a. m. the wind continued from the northwest increasing steadily in force, with squalls, steady rain, and rapidly falling barometer. At 3:30 a. m. a terrific wind squall occurred, during which a velocity of 76 miles per hour was recorded for five minutes with an extreme velocity (one mile) of 80 miles per hour. From that hour there was a slow but perceptible decrease in the wind force, although heavy gusts and squalls continued, and the barometer fell until 4:30 a. m. At 4:05 a. m. the wind shifted from northwest to west, to southeast at 5:40 a. m., and to south at 8 a. m., with rapidly rising barometer. During the nine hours ending 3 p. m. the rainfall amounted to 5.41 inches. Great damage was done to roofs, etc., the streets being littered with débris. The damage to shipping was considerable; lighters were blown ashore, dredges went adrift, and two barges were stranded on the river front; railroad roadbeds were washed out and telegraph and telephone lines were prostrated, leaving the city without communication. The estimated damage in the city of Savannah was $250,000, and rice plantations suffered to the extent of over $150,000.

The storm was not severely felt at Charleston, S. C., and did not extend to Jacksonville, Fla.

## THUNDERSTORM FORECASTS.

The thunderstorms of the 15th, 16th, and 17th in the Chicago district were accurately forecast. They were particularly severe in the vicinity of Chicago, and the forecasts were strongly commended by the local press. Severe squalls occurred on Lake Michigan the night of the 24th, causing the capsizing of two schooners at Egg Harbor, Wis., and the foundering of two barges in tow near Muskegon, Mich. Sufficient warning of this storm was given by the Chicago office, the forecast sent to all Lake Michigan ports on the 23d being as follows:

Variable winds, shifting to fresh and brisk northerly; thunderstorms to-night.—*H. J. Cox, Forecast Official.*

## AREAS OF HIGH AND LOW PRESSURES.

During the month there were six highs and nine lows sufficiently well defined to be traced on Charts I and II. The principal points regarding their origin and disappearance, their duration, length of path, and velocity, will be found in the accompanying table. In making up the summary of lows No. IX was omitted as having too short and erratic a path to be considered in the monthly mean. In general the highs and lows of the month have been very indefinite and hard to follow on the weather maps. In Alberta and Assiniboia the reductions of barometer readings to sea level have been made by using the current temperature instead of the mean of a. m. and p. m. as in the United States. As a result of this there are very often fictitious highs in the morning and fictitious lows in the evening to the north of Montana. Some allowance has to be made for these conditions in tracing highs and lows.

*Highs.*—The general tendency of the highs has been to appear along the northern boundary of this country. Nos. I and IV could be traced from the Pacific coast. Nos. II, III, and VI began in the northwest, and V in the upper Mississippi Valley. Nos. I, II, and III disappeared off the north Atlantic coast, and V in the Middle Atlantic States, II off the south Atlantic coast, and IV in the lower St. Lawrence Valley.

*Lows.*—The lows of the month appeared to move along the northern boundary like the highs. Nos. III, V, VI, VII, and VIII began near the north Pacific coast. No. IV was first noted to the north of Montana, No. I in the middle Mississippi Valley, and IX was a tropical storm which was first noted off the north coast of Florida morning of 30th, and disappeared in Alabama p. m. of September 1. This last storm gave the highest winds of the month, 80 miles an hour at Savannah, Ga. A full account will be found elsewhere. On the 12th, as storm V was passing along the lower Lakes a most extraordinary rainfall was experienced at Washington City. The rain came in torrents all day long, and at 8 p. m. 4.92 inches had fallen in twelve hours. This storm was surprisingly local in its occurrence, and seems to have been central about 2.5 miles from the capitol. The distributing reservoir in Georgetown measured 5.93 inches on a. m. of 13th, and the second reservoir, about 4 miles beyond, measured 5.44 inches. Alexandria, Va., about 8 miles distant, had but 2.16 inches. It is probable the severe rain did not extend more than 6 miles across. Great Falls, 16 miles distant, measured only 0.93 inch total fall from a. m. of 12th till a. m. of 13th, and Kensington, 9 miles north, had but 1.87 inch. This was an example of a sporadic rain distinct from any low area or secondary formation, and presents a most interesting example for study.—*H. A. Hazen, Professor.*

*Movements of centers of areas of high and low pressure.*

| Number. | First observed. | | | Last observed. | | | Path. | | Average velocities. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Date. | Lat. N. | Long. W. | Date. | Lat. N. | Long W. | Length. | Duration. | Daily. | Hourly. |
| High areas. | | ° | ° | | ° | ° | *Miles.* | *Days.* | *Miles.* | *Miles.* |
| I | 1, a. m. | 33 | 120 | 11, p. m. | 45 | 58 | 5,260 | 10.5 | 504 | 21.0 |
| II | 2, p. m. | 45 | 100 | 7, a. m. | 34 | 77 | 1,830 | 4.5 | 407 | 17.0 |
| III | 9, a. m. | 48 | 110 | 15, a. m. | 42 | 66 | 2,940 | 6.0 | 490 | 20.4 |
| IV | 14, p. m. | 47 | 128 | 19, a. m. | 48 | 72 | 2,840 | 4.5 | 631 | 26.3 |
| V | 18, p. m. | 43 | 90 | 20, p. m. | 39 | 78 | 960 | 2.0 | 480 | 20.0 |
| VI | 25, a. m. | 52 | 104 | 29, a. m. | 45 | 61 | 2,280 | 4.0 | 570 | 23.7 |
| Total | | | | | | | 16,110 | 31.5 | 3,082 | 128.4 |
| Mean of 6 paths | | | | | | | 2,685 | | 514 | 21.4 |
| Mean of 31.5 days | | | | | | | | | 511 | 21.3 |
| Low areas. | | | | | | | | | | |
| I | †30, p. m. | 37 | 88 | 2, p. m. | 45 | 60 | 1,560 | 3.0 | 520 | 21.7 |
| II | 1, p. m. | 43 | 104 | 6, a. m. | 51 | 61 | 2,400 | 4.5 | 533 | 22.2 |
| III | 1, p. m. | 49 | 122 | 7, a. m. | 33 | 97 | 2,640 | 5.5 | 480 | 20.0 |
| IV | 4, p. m. | 54 | 106 | 9, p. m. | 48 | 55 | 2,520 | 5.0 | 524 | 21.8 |
| V | 7, a. m. | 46 | 126 | 13, p. m. | 52 | 65 | 3,480 | 6.5 | 535 | 22.3 |
| VI | 11, p. m. | 47 | 117 | 15, a. m. | 44 | 83 | 1,710 | 3.5 | 489 | 20.4 |
| VII | 19, p. m. | 53 | 116 | 27, a. m. | 47 | 64 | 3,480 | 7.5 | 464 | 19.3 |
| VIII | 25, a. m. | 52 | 126 | 29, p. m. | 51 | 68 | 2,400 | 4.5 | 533 | 22.2 |
| IX* | 30, a. m. | 30 | 80 | ‡1, p. m. | 33 | 87 | 510 | 2.5 | 204 | 8.5 |
| Total | | | | | | | 20,190 | 40.0 | 4,078 | 169.9 |
| Mean of 8 paths | | | | | | | 2,524 | | 510 | 21.2 |
| Mean of 40 days | | | | | | | | | 505 | 21.0 |

* Not included in final means. † July. ‡ September.

## RIVERS AND FLOODS.

General, and in some instances abnormally heavy, rainfall over the drainage areas of the principal rivers kept all streams, except the upper and middle Mississippi and Missouri rivers, at stages in excess of the usual summer conditions, and as a result navigation and logging were successfully carried on during the entire month of August, 1898.

On the rivers of the Atlantic coast and Gulf States, and on the Ohio and Tennessee rivers, the high stages were very beneficial to river traffic, but were, on the other hand, detrimental to riparian owners, overflowing their lands and doing considerable damage to crops. In the Ohio River a moderate flood prevailed from the 6th to 13th, and although timely warnings were issued, which enabled merchants to save merchandise, farmers were unable to remove crops and

much damage resulted thereto. While barge and coal-boat shipment was brisk, river construction work, which depends on low water, was practically suspended.

In the upper and middle Mississippi and Missouri watersheds ample rain fell, but it had no appreciable effect upon the rivers.

The highest and lowest water, mean stage, and monthly range at 117 river stations are given in the accompanying table. Hydrographs for typical points on seven principal rivers are shown on the Chart. The stations selected for charting are: Keokuk, St. Louis, Cairo, Memphis, and Vicksburg, on the Mississippi; Cincinnati, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

The following résumé of river stages in the respective streams is compiled from reports by the officials of the Weather Bureau at various river stations.

For fuller details see Monthly Bulletin of the River and Flood Service for August, 1898.—*E. B. Garriott, Professor in charge Forecast Division.*

*Heights of rivers referred to zeros of gauges, August, 1898.*

| Stations. | Distance to mouth of river. | Danger line on gauge. | Highest water. | | Lowest water. | | Mean stage. | Monthly range. |
|---|---|---|---|---|---|---|---|---|
| | | | Height. | Date. | Height. | Date. | | |
| *Mississippi River.* | *Miles.* | *Feet.* | *Feet.* | | *Feet.* | | *Feet.* | *Feet.* |
| St. Paul, Minn | 1,957 | 14 | 3.8 | 1,2,6 | 2.7 | 15,20 | 3.1 | 1.1 |
| Reeds Landing, Minn | 1,887 | 12 | 2.0 | 1 | 1.0 | 25-31 | 1.4 | 1.0 |
| La Crosse, Wis | 1,822 | 12 | 3.2 | 1 | 1.8 | 26-31 | 2.3 | 1.4 |
| North McGregor, Iowa | 1,762 | 18 | 2.7 | 1 | 1.2 | 30,31 | 2.1 | 1.5 |
| Dubuque, Iowa | 1,702 | 15 | 3.0 | 3 | 1.3 | 31 | 2.1 | 1.7 |
| Leclaire, Iowa | 1,612 | 10 | 2.2 | 17 | 0.9 | 31 | 1.4 | 1.3 |
| Davenport, Iowa | 1,596 | 15 | 3.5 | 18 | 1.6 | 31 | 2.4 | 1.9 |
| Galland, Iowa | 1,475 | 8 | 3.2 | 17,18 | 1.0 | 13 | 1.5 | 1.3 |
| Keokuk, Iowa | 1,466 | 14 | 5.2 | 18 | 1.4 | 12,13, 30,31 | 2.3 | 3.8 |
| Hannibal, Mo | 1,405 | 17 | 6.3 | 19 | 2.6 | 31 | 3.5 | 3.7 |
| Grafton, Ill | 1,307 | 23 | 7.2 | 20,21 | 3.8 | 14 | 5.1 | 3.4 |
| St. Louis, Mo † | 1,264 | 30 | 12.3 | 4 | 6.4 | 31 | 9.2 | 5.9 |
| Chester, Ill | 1,189 | 30 | 9.6 | 5 | 4.1 | 31 | 6.8 | 5.5 |
| Cairo, Ill | 1,073 | 45 | 27.4 | 19 | 14.5 | 29,30 | 19.7 | 12.9 |
| Memphis, Tenn | 843 | 33 | 19.1 | 21 | 8.7 | 1 | 13.2 | 10.4 |
| Helena, Ark | 767 | 42 | 26.8 | 22 | 13.4 | 1 | 19.5 | 13.4 |
| Arkansas City, Ark | 635 | 42 | 28.2 | 24 | 15.0 | 1,2 | 21.9 | 13.2 |
| Greenville, Miss | 595 | 42 | 23.2 | 24,25 | 12.0 | 1,3 | 17.6 | 11.2 |
| Vicksburg, Miss | 474 | 45 | 25.8 | 25,26 | 13.5 | 2-4 | 19.5 | 12.3 |
| New Orleans, La | 108 | 16 | 7.4 | 29 | 4.1 | 3,4 | 5.6 | 3.3 |
| *Arkansas River.* | | | | | | | | |
| Wichita, Kans | 720 | 10 | 2.6 | 9,10 | 1.2 | 27-31 | 1.7 | 1.4 |
| Fort Smith, Ark | 345 | 22 | 15.2 | 3 | 4.6 | 27 | 8.4 | 10.6 |
| Dardanelle, Ark | 250 | 21 | 15.0 | 5 | 4.4 | 29 | 8.6 | 10.6 |
| Little Rock, Ark | 170 | 23 | 13.2 | 14 | 5.9 | 31 | 10.0 | 7.3 |
| *White River.* | | | | | | | | |
| Newport, Ark | 150 | 26 | 20.7 | 12 | 3.6 | 31 | 9.6 | 17.1 |
| *Des Moines River.* | | | | | | | | |
| Des Moines, Iowa | 150 | 19 | 3.1 | 26-31 | 2.7 | 10-12 | 2.9 | 0.4 |
| *Illinois River.* | | | | | | | | |
| Peoria, Ill | 135 | 14 | 5.7 | 19 | 4.1 | 1-4,15 | 4.7 | 1.6 |
| *Missouri River.* | | | | | | | | |
| Bismarck, N. Dak | 1,201 | 14 | 5.4 | 1 | 3.0 | 31 | 4.1 | 2.4 |
| Pierre, S. Dak | 1,006 | 14 | 5.4 | 1 | 3.2 | 29-31 | 4.1 | 2.2 |
| Sioux City, Iowa | 676 | 19 | 9.8 | 1 | 5.7 | 30,31 | 7.4 | 4.1 |
| Omaha, Nebr | 561 | 18 | 10.5 | 1 | 7.5 | 31 | 8.9 | 3.0 |
| St. Joseph, Mo | 373 | 10 | 5.4 | 1 | 2.5 | 31 | 3.9 | 2.9 |
| Kansas City, Mo | 280 | 21 | 11.9 | 1 | 7.3 | 31 | 9.5 | 4.6 |
| Boonville, Mo | 191 | 30 | 10.9 | 1 | 6.4 | 31 | 8.4 | 4.5 |
| Hermann, Mo | 95 | 24 | 11.4 | 2 | 5.8 | 31 | 8.4 | 5.6 |
| *Ohio River.* | | | | | | | | |
| Pittsburg, Pa | 966 | 22 | 12.9 | 12 | 2.9 | 18 | 6.8 | 10.0 |
| Davis Island Dam, Pa | 960 | 25 | 13.1 | 20 | 3.3 | 3,4 | 7.1 | 9.8 |
| Wheeling, W. Va | 875 | 36 | 17.5 | 21 | 4.3 | 4 | 8.7 | 13.2 |
| Parkersburg, W. Va | 785 | 36 | 16.9 | 22 | 6.2 | 1 | 10.2 | 10.7 |
| Point Pleasant, W. Va | 703 | 39 | 30.9 | 12 | 4.9 | 2 | 12.7 | 26.0 |
| Catlettsburg, Ky | 651 | 50 | 40.5 | 12 | 7.2 | 31 | 17.1 | 33.3 |
| Portsmouth, Ohio | 612 | 50 | 39.6 | 12 | 8.2 | 31 | 17.9 | 31.4 |
| Cincinnati, Ohio | 499 | 50 | 39.9 | 13 | 11.2 | 1 | 20.2 | 28.7 |
| Louisville, Ky | 367 | 28 | 14.2 | 15 | 6.0 | 1 | 8.6 | 8.2 |
| Evansville, Ind | 184 | 35 | 28.3 | 17 | 8.0 | 1 | 15.0 | 20.3 |
| Paducah, Ky | 47 | 40 | 23.0 | 18,19 | 6.8 | 1 | 13.2 | 16.2 |
| *Allegheny River.* | | | | | | | | |
| Warren, Pa | 177 | 7 | 5.0 | 20 | 0.3 | 4 | 1.8 | 4.7 |
| Oil City, Pa | 123 | 13 | 6.6 | 19 | 0.8 | 1-3 | 2.3 | 5.8 |
| Parkers Landing, Pa | 73 | 20 | 8.0 | 19 | 0.8 | 2,3 | 2.3 | 7.2 |
| Freeport, Pa | 26 | 20 | 13.2 | 20 | 1.5 | 3 | 4.0 | 11.7 |
| *Conemaugh River.* | | | | | | | | |
| Johnstown, Pa | 64 | 7 | 6.8 | 19 | 1.3 | 3 | 2.5 | 5.5 |
| *Red Bank Creek.* | | | | | | | | |
| Brookville, Pa | 35 | 8 | 2.8 | 19 | 0.2 | 1-4 | 0.7 | 2.6 |
| *Beaver River.* | | | | | | | | |
| Ellwood Junction, Pa | 10 | 14 | 5.5 | 19 | 0.0 | 31 | 1.1 | 5.5 |
| *Cumberland River.* | | | | | | | | |
| Burnside, Ky | 434 | 50 | 24.6 | 10 | 1.3 | 31 | 5.8 | 23.3 |
| Carthage, Tenn | 257 | 30 | 19.9 | 13 | 1.7 | 31 | 6.4 | 18.2 |
| Nashville, Tenn | 175 | 40 | 24.4 | 11 | 2.4 | 31 | 9.7 | 22.0 |

*Heights of rivers above zeros of gauges*—Continued.

| Stations. | Distance to mouth of river. | Danger line on gauge. | Highest water. | | Lowest water. | | Mean stage. | Monthly range. |
|---|---|---|---|---|---|---|---|---|
| | | | Height | Date. | Height. | Date. | | |
| *Great Kanawha River.* | *Miles.* | *Feet.* | *Feet.* | | *Feet.* | | *Feet.* | *Feet.* |
| Charleston, W. Va | 61 | 30 | 31.0 | 11 | 4.5 | 19 | 8.8 | 26.5 |
| *New River.* | | | | | | | | |
| Hinton, W. Va | 95 | 14 | 9.0 | 11 | 1.6 | 25 | 3.0 | 7.4 |
| *Licking River.* | | | | | | | | |
| Falmouth, Ky | 30 | 25 | 8.6 | 12 | 1.0 | 31 | 3.5 | 7.6 |
| *Miami River.* | | | | | | | | |
| Dayton, Ohio | 69 | 18 | 2.6 | 10 | 0.9 | 31 | 1.5 | 1.7 |
| *Monongahela River.* | | | | | | | | |
| Weston, W. Va | 161 | 18 | 6.0 | 11 | — 1.0 | 30,31 | 0.6 | 7.0 |
| Fairmont, W. Va | 119 | 25 | 14.9 | 11 | 0.2 | 31 | 3.7 | 14.7 |
| Greensboro, Pa | 81 | 18 | 20.3 | 11 | 7.0 | 29-31 | 9.4 | 13.3 |
| Lock No. 4, Pa | 40 | 28 | 23.3 | 11 | 6.0 | 31 | 10.8 | 17.3 |
| *Cheat River.* | | | | | | | | |
| Rowlesburg, W. Va | 36 | 14 | 9.4 | 11 | 2.0 | 1,2 | 4.2 | 7.4 |
| *Youghiogheny River.* | | | | | | | | |
| Confluence, Pa | 59 | 10 | 7.4 | 10 | 1.5 | 31 | 3.7 | 5.9 |
| West Newton, Pa | 15 | 23 | 10.1 | 11 | 0.7 | 1 | 3.0 | 9.4 |
| *Muskingum River.* | | | | | | | | |
| Zanesville, Ohio | 70 | 20 | 11.3 | 21 | 6.9 | 30 | 8.4 | 4.4 |
| *Tennessee River.* | | | | | | | | |
| Kingston, Tenn | 534 | 25 | 11.1 | 13 | 1.8 | 27,28 | 4.5 | 9.3 |
| Chattanooga, Tenn | 430 | 33 | 15.8 | 14 | 3.9 | 31 | 8.1 | 11.9 |
| Bridgeport, Ala | 390 | 24 | 12.2 | 15 | 2.2 | 27,28 | 5.8 | 10.0 |
| Florence, Ala | 220 | 16 | 10.0 | 16 | 1.9 | 30 | 5.5 | 8.1 |
| Johnsonville, Tenn | 94 | 21 | 13.6 | 12 | 3.2 | 31 | 7.9 | 10.4 |
| *Clinch River.* | | | | | | | | |
| Speers Ferry, Va | 156 | 20 | 10.8 | 11 | 0.4 | 25,31 | 2.3 | 10.4 |
| Clinton, Tenn | 46 | 25 | 21.0 | 12 | 4.0 | 27,31 | 8.4 | 17.0 |
| *Wabash River.* | | | | | | | | |
| Mount Carmel, Ill | 50 | 15 | 3.0 | 10 | 1.6 | 29-31 | 2.0 | 1.4 |
| *Red River.* | | | | | | | | |
| Arthur City, Tex | 688 | 27 | 13.7 | 6 | 5.0 | 26 | 7.7 | 8.7 |
| Fulton, Ark | 565 | 28 | 12.8 | 11 | 4.0 | 28-31 | 7.4 | 8.8 |
| Shreveport, La | 449 | 29 | 7.6 | 13-15 | 2.6 | 31 | 5.3 | 5.0 |
| Alexandria, La | 139 | 33 | 5.4 | 18,19 | 1.6 | 31 | 4.0 | 3.8 |
| *Atchafalaya Bayou.* | | | | | | | | |
| Melville, La | 100* | 31 | 22.3 | 28-30 | 14.6 | 8 | 18.4 | 7.7 |
| *Ouachita River.* | | | | | | | | |
| Camden, Ark | 340 | 39 | 7.2 | 13 | 4.1 | 26,27,31 | 4.9 | 3.1 |
| Monroe, La | 100 | 40 | 6.3 | 1 | 2.0 | 30,31 | 3.7 | 4.3 |
| *Yazoo River.* | | | | | | | | |
| Yazoo City, Miss | 80 | 25 | 8.8 | 15,16 | 1.5 | 31 | 2.8 | 7.3 |
| *Chattahoochee River.* | | | | | | | | |
| Columbus, Ga | 140 | 20 | 15.8 | 28 | 2.9 | 25 | 7.8 | 12.9 |
| *Flint River.* | | | | | | | | |
| Albany, Ga | 80 | 20 | 14.0 | 21 | 2.0 | 26 | 6.9 | 12.0 |
| *Cape Fear River.* | | | | | | | | |
| Fayetteville, N. C | 100 | 38 | 29.2 | 22 | 2.3 | 11 | 9.8 | 26.9 |
| *Columbia River.* | | | | | | | | |
| Umatilla, Oreg | 270 | 25 | 11.7 | 1 | 8.3 | 31 | 9.9 | 3.4 |
| The Dalles, Oreg | 166 | 40 | 18.5 | 1 | 12.5 | 28,31 | 14.9 | 6.0 |
| *Willamette River.* | | | | | | | | |
| Albany, Oreg | 99 | 20 | 1.0 | 1-3 | 0.7 | 29-31 | 0.8 | 0.3 |
| *Edisto River.* | | | | | | | | |
| Edisto, S. C | 75 | 6 | 4.9 | 31 | 2.2 | 10,11 | 3.2 | 2.7 |
| *James River.* | | | | | | | | |
| Lynchburg, Va | 257 | 18 | 9.5 | 11 | 0.5 | 31 | 2.2 | 9.0 |
| Richmond, Va | 110 | 12 | 7.1 | 13 | 0.0 | 27-31 | 1.7 | 7.1 |
| *Alabama River.* | | | | | | | | |
| Montgomery, Ala | 265 | 35 | 19.5 | 12 | 2.4 | 23,25,26 | 7.1 | 17.1 |
| Selma, Ala | 212 | 35 | 22.7 | 13 | 2.8 | 26 | 9.1 | 19.9 |
| *Coosa River.* | | | | | | | | |
| Rome, Ga | 225 | 30 | 9.9 | 11 | 1.9 | 25 | 3.8 | 8.0 |
| Gadsden, Ala | 144 | 18 | 8.9 | 13 | 1.0 | 26,27 | 3.8 | 7.9 |
| *Tombigbee River.* | | | | | | | | |
| Columbus, Miss | 285 | 33 | 2.4 | 12 | —3.5 | 28,29 | —1.4 | 5.9 |
| Demopolis, Ala | 155 | 35 | 11.5 | 14 | —1.0 | 25 | 3.4 | 12.5 |
| *Black Warrior River.* | | | | | | | | |
| Tuscaloosa, Ala | 90 | 38 | 14.1 | 12 | 0.5 | 25 | 3.4 | 13.6 |
| *Pedee River.* | | | | | | | | |
| Cheraw, S. C | 145 | 27 | 29.5 | 22 | 1.0 | 6,7,11 | 6.6 | 28.5 |
| *Black River.* | | | | | | | | |
| Kingstree, S. C | 60 | 12 | 7.1 | 31 | 4.1 | 12 | 5.2 | 3.0 |
| *Lumber River.* | | | | | | | | |
| Fairbluff, N. C | 10 | 6 | 4.4 | 31 | 1.1 | 1 | 2.6 | 3.3 |
| *Lynch Creek.* | | | | | | | | |
| Effingham, S. C | 35 | 12 | 13.7 | 30 | 4.4 | 12 | 7.4 | 9.3 |
| *Potomac River.* | | | | | | | | |
| Harpers Ferry, W. Va | 170 | 16 | 15.5 | 12 | 1.6 | 4 | 4.2 | 13.9 |
| *Roanoke River.* | | | | | | | | |
| Clarksville, Va | 155 | 12 | 3.6 | 16 | 0.4 | 5 | 1.3 | 3.2 |
| *Sacramento River.* | | | | | | | | |
| Red Bluff, Cal | 241 | 23 | —0.6 | 1-9 | —0.8 | 26-31 | —0.7 | 0.2 |
| Sacramento, Cal | 70 | 25 | 7.6 | 1-6 | 7.2 | 26-31 | 7.4 | 0.4 |
| *Santee River.* | | | | | | | | |
| St. Stephens, S. C | 50 | 12 | 8.4 | 31 | 6.2 | 9 | 7.3 | 2.2 |
| *Congaree River.* | | | | | | | | |
| Columbia, S. C | 37 | 15 | 5.0 | 20 | 1.6 | 4,5,7 | 2.7 | 3.4 |
| *Wateree River.* | | | | | | | | |
| Camden, S. C | 45 | 24 | 25.1 | 21 | 4.0 | 4 | 10.2 | 21.1 |
| *Savannah River.* | | | | | | | | |
| Augusta, Ga | 130 | 32 | 19.9 | 20 | 6.5 | 4 | 11.2 | 13.4 |
| *Susquehanna River.* | | | | | | | | |
| Wilkesbarre, Pa | 178 | 14 | 6.0 | 27,28 | 0.0 | 1-3 | 2.9 | 6.0 |
| Harrisburg, Pa | 70 | 17 | 5.3 | 6 | 1.4 | 1,3 | 3.1 | 3.9 |
| *Juniata River.* | | | | | | | | |
| Huntingdon, Pa | 80 | 24 | 6.5 | 5 | 3.0 | 2,3,8, 16-18, 24-31 | 3.5 | 3.5 |
| *W. Br. of Susquehanna.* | | | | | | | | |
| Williamsport, Pa | 35 | 20 | 6.8 | 20 | 1.0 | 1,3,12, 13,17,18 | 1.9 | 5.8 |
| *Waccamaw River.* | | | | | | | | |
| Conway, S. C | 40 | 7 | 4.7 | 31 | 1.5 | 1 | 3.0 | 3.2 |

*Distance to Gulf of Mexico. †Record for 30 days.

# THE WEATHER OF THE MONTH.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

The statistical aspects of the weather of the month are presented in the tables which form the closing part of this REVIEW. Table I, in particular, contains numerous details that are important in the study of climatology. The numerical values in the tables have been generalized in a number of cases, the results appearing on Charts Nos. III to VII, inclusive.

## PRESSURE AND WIND.

*Normal conditions.*—The geographic distribution of normal barometric readings at sea level and under local gravity for August is shown by Chart V of the MONTHLY WEATHER REVIEW for August, 1893.

Normal pressure for August is highest, 30.00 inches and over, from the Ohio Valley southeastward to the Gulf and Atlantic coasts, reaching a maximum of about 30.05 on the South Carolina coast. It is also high, about 30.05, on the coast of Washington and Oregon. Normal pressure is lowest over the Rocky Mountain and Plateau regions with a minimum of 29.80 inches at Yuma, Ariz. As compared with July, there is generally an increase in pressure in all districts, except on the Pacific coast and south of latitude 35°. The greatest decrease, .05 inch, occurs over the Florida Peninsula; the greatest increase, .05 inch, over New England.

The prevailing winds of August differ but slightly from those of July, On the south Atlantic and west Gulf coasts, in the Mississippi Valley, and generally throughout the Plains region, the prevailing winds are southeasterly, as would be expected from a consideration of the pressure gradients. There are, however, a number of cases where the direction of the wind is determined by local conditions and topography rather than pressure gradients. On the Pacific coast the prevailing winds are westerly and northwesterly, as would be expected. The winds of the Rocky Mountain and Plateau regions are variable; the prevailing winds of the Lake region and New England are southwesterly.

*The current month.*—The distribution of monthly mean pressure, as shown by Chart IV, is in general accord with normal conditions. Pressure was above normal at Halifax and Sydney and south of a line drawn from southern New Jersey to the mouth of the Mississippi River, the area of maximum departures, +.08 inch, being on the coast from Hatteras to Charleston. Pressure was also above normal at a few isolated stations in the Rocky Mountain region; elsewhere it was below normal by amounts varying from .01 inch on the New England coast to .11 inch at Roseburg Oreg. The departures exceeded .05 inch generally over the northern Plateau, north Pacific coast and interior California. As compared with July, pressure fell decidedly over almost the entire country. There was a slight rise over the Carolinas, New Mexico, and portions of the adjoining States of Texas and Arizona, and also over Saskatchewan, Alberta, and Assiniboia.

The direction of the surface winds was in almost all cases in close accord with normal conditions.

## TEMPERATURE OF THE AIR.

*Normal conditions.*—The normal temperature of the air in the United States in August varies from about 84° at Key West, 81° at Jacksonville, 81° at New Orleans, 83° at Galveston, 69° at San Diego, to 61° at Eastport, 69° at Burlington, 68° at Buffalo, 70° at Detroit, 65° at Duluth, 63° at St. Vincent, 66° at Havre, 69° at Spokane, and 63° at Seattle, on Puget Sound. The warmest regions are the lower Rio Grande Valley and southwestern Arizona, including a portion of the desert region of California; the coolest portion of the country is the region about Lake Superior. The seacoast is cooler than the interior on corresponding parallels.

In studying the distribution of monthly mean temperatures it will be found very helpful to consult the charts at the end of this REVIEW, especially No. VI, Surface Temperatures, Maximum, Minimum, and Mean. This chart gives a very good idea of the variations of temperature with latitude and longitude, and also of the distribution of normal surface temperatures. Chart VI for any month will differ from a normal chart merely in the displacement or bending of the isotherms northward or southward according as the temperature of the particular locality is above or below the normal for the place and season.

*The current month.*—The month opened with temperature below normal from the Mississippi Valley westward to the middle Plateau, except over a narrow fringe of country on the northern border. Temperature was much above normal on the Atlantic seaboard westward to the Ohio Valley and also on the northern Pacific coast and northern Plateau. By the second week of the month the high temperatures on the northern Plateau had spread southward and eastward to the eastern foothills of the Rocky Mountains. Temperature was still below normal in the Mississippi Valley and low temperatures prevailed over a portion of the Middle and south Atlantic States. Temperature was above normal during the third week over practically all of the country except a portion of the north Pacific coast and the northern Plateau. During the fourth week similar conditions obtained, the average daily excess being greatest (from 6° to 11°) in the lower Missouri Valley.

The month as a whole was warmer than usual, although in a few districts there was a slight deficit in the average daily temperature.

The maximum temperature for the month at regular Weather Bureau stations was 113°; that temperature being registered at three different stations on as many different dates, viz, Walla Walla, Wash., on the 10th; Fresno, Cal., on the 11th; and Yuma, Ariz., on the 18th. There were no unusually high temperatures east of the Rocky Mountains, although much suffering was caused by the humid condition of the atmosphere. Prostrations and deaths from heat occurred in the Mississippi and Missouri valleys, the Lake region and the Middle Atlantic States, August 22, 23, 24, and 25. There were a few deaths and prostrations in New York and Pennsylvania, and, possibly, in other eastern States on August 4 and again on August 9. In the Lake region prostrations were reported on the 31st; there were also a few cases of prostration and death, due to excessive heat, in California. The latter part of the month was especially trying east of the Mississippi River on account of the humid state of the atmosphere. It is to be noted, however, that there were not many fatal cases of sunstroke, notwithstanding the high relative humidity. The maximum temperature did not reach 100° east of the Mississippi except in the lower Mississippi Valley. Maximum temperatures ranging from 100° to 108° occurred in Central Kansas and the Missouri Valley from Omaha to eastern Montana. Maximum temperatures of over 100° were also recorded in the head waters of the Platte River Valley, and in Southern Central Wyoming.

A rather unusual case of local heating over an elliptical-shaped area occurred in central Kansas, where the monthly mean temperature was from 2° to 6° higher than at surrounding stations on all sides. The monthly mean temperature in

the Missouri Valley and eastern Kansas, under normal conditions, should be higher than in central Kansas, yet it was fully 3° lower than over the area above mentioned.

Temperatures of 32° were registered at a few stations in the Rocky Mountain region.

The distribution of the observed monthly mean temperature of the air is shown by red lines (isotherms) on Chart VI. This chart also shows the maximum and the minimum temperatures, the former by black and the latter by dotted lines. As will be noticed, these lines have been drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level; the isotherms relate, therefore, to the average surface of the country in the neighborhood of the various observers, and as such must differ greatly from the sea-level isotherms of Chart IV.

The average temperatures of the respective geographic districts, the departures from the normal of the current month and from the general mean since the first of the year, are presented in the table below for convenience of reference:

*Average temperatures and departures from the normal.*

| Districts. | Number of stations. | Average temperatures for the current month. | Departures for the current month. | Accumulated departures since January 1. | Average departures since January 1. |
|---|---|---|---|---|---|
| | | ° | ° | ° | ° |
| New England | 10 | 69.7 | + 2.5 | + 9.8 | + 1.2 |
| Middle Atlantic | 12 | 75.7 | + 2.4 | +12.7 | + 1.6 |
| South Atlantic | 10 | 79.6 | + 1.1 | + 7.2 | + 0.9 |
| Florida Peninsula | 7 | 81.1 | 0.0 | + 2.6 | + 0.3 |
| East Gulf | 7 | 79.8 | − 0.3 | + 4.0 | + 0.5 |
| West Gulf | 7 | 81.9 | + 1.3 | +11.5 | + 1.4 |
| Ohio Valley and Tennessee | 12 | 76.8 | + 2.0 | +14.7 | + 1.8 |
| Lower Lake | 8 | 71.8 | + 2.4 | +21.9 | + 2.7 |
| Upper Lake | 9 | 66.6 | + 0.8 | +21.5 | + 2.7 |
| North Dakota | 7 | 65.5 | + 0.4 | +22.8 | + 2.8 |
| Upper Mississippi | 11 | 73.6 | + 0 8 | +18.1 | + 2.3 |
| Missouri Valley | 10 | 75.1 | + 1.9 | +21.0 | + 2.6 |
| Northern Slope | 7 | 70.4 | + 2.6 | +10.1 | + 1.3 |
| Middle Slope | 6 | 76.6 | + 1.9 | +10.7 | + 1.3 |
| Southern Slope | 5 | 77.7 | − 0.6 | + 5.9 | + 0.7 |
| Southern Plateau | 13 | 78.8 | + 0.6 | − 0.1 | 0.0 |
| Middle Plateau | 9 | 72.4 | + 2.0 | − 4.0 | − 0.5 |
| Northern Plateau | 11 | 72.3 | + 2.8 | + 8.0 | + 1.0 |
| North Pacific | 9 | 63.3 | + 1.9 | + 7.6 | + 1.0 |
| Middle Pacific | 5 | 64.4 | − 0.4 | − 5.0 | − 0.6 |
| South Pacific | 4 | 72.9 | + 1.5 | + 2.4 | + 0.3 |

*In Canada.*—Professor Stupart says:

The mean temperature was above average over the larger portion of the Dominion, Keewatin, Manitoba and Assiniboia alone showing average or a little below. The largest excess occurred in the upper mainland of British Columbia, where it was at many points as much as 6° and 8°. The Province of Ontario, northward from Lakes Erie and Ontario, showed the next largest excess, amounting to between 3° and 5°, and eastward from this, in Quebec and the Maritime Provinces, the departure above average ranged between 3° and the average.

## PRECIPITATION.

*Normal conditions.*—The regions of heavy precipitation (4 to 6 inches and over) in August are on the south Atlantic and eastern Gulf coasts, including the Peninsula of Florida, whence the fall decreases irregularly to the Dakotas and Montana, where it is about an inch. The rainfall of Arizona and New Mexico is comparatively heavy during the months of July and August. The rainfall of California is almost *nil*, except on the coast region of the northern part of the State, whence it increases to a maximum of about 2 inches on the coast of Washington.

*Current month.*—The month was one of generous rainfall over almost the entire country, the fall east of the Mississippi being larger than for many years. Torrential rains fell in a number of places on the south Atlantic and Gulf coasts, the greatest monthly fall (31 inches) being in western Florida. There was also very heavy rain in the region about Savannah and in various localities throughout Florida where the total monthly fall exceeded 20 inches. On the eastern slope of the Appalachians, in Georgia and Florida, the fall was also quite heavy, being over 10 inches at a number of places. Local falls of 10 inches or more for the month also occurred in West Virginia, western Maryland, northern Virginia, and eastern Pennsylvania, and quite generally throughout Georgia, Alabama, and Florida. The greatest downpour in twenty-four hours or less occurred at Marion, Ala., 9.90 inches of water falling on the 10th from 8 a. m. to 6 p. m. The station at Marion is not equipped with a self-registering gauge, hence no information relative to the varying intensity of the storm can be had. Falls of 10 inches in twenty-four hours are liable to occur on the Gulf and South Atlantic coasts, in the Mississippi Valley, and at less frequent intervals in the Ohio Valley and the Middle Atlantic States.

During the current month daily falls varying from 4 to 8 inches occurred mainly throughout Florida and Georgia, although such falls were not by any means wholly confined to those States.

### HEAVY LOCAL RAINSTORMS.

A very interesting and instructive illustration of the purely local character of heavy rains is found in the storm of the 12th in the District of Columbia. Heavy rain began about the middle of the forenoon and continued with varying intensity until about 6 p. m., 4.92 inches of rain having fallen. The storm was purely local, however, as may be seen from the table below, in which the catch of a number of gauges in the District and vicinity for the twenty-four hours is given. The distance of the various gauges in miles from the capitol building is also given.

*Heavy rains in the vicinity of Washington, D. C., August* 12, 1898.

| Gauges. | Amount. | Distance and direction from Capitol. |
|---|---|---|
| | *Inches.* | |
| Great Falls, Md | 0.93 | 16 miles northwest. |
| Kensington, Md | 1.87 | 9 miles north-northwest. |
| Laurel, Md | 1.40 | 18 miles northeast. |
| Manassas, Va | 0.90 | 30 miles southwest. |
| Receiving Reservoir, D. C | 5.44 | 6½ miles northwest. |
| Takoma Park, D. C | 5.34 | 5½ miles north. |
| College Park, Md | 2.76 | 7½ miles northeast. |
| Alexandria, Va | 2.16 | 6 miles south. |
| Distributing Reservoir, D. C | 5.93 | 4 miles northwest. |
| 30th and M streets, Washington, D. C. | 4.85 | 2½ miles northwest. |
| Weather Bureau, Washington, D. C. * | 4.96 | 2 miles northwest. |

*1.30 inch fell in 1 hour and 5 minutes.

Torrential rains on August 24 in northern central New York caused a number of serious washouts, particularly on railroads centering at Utica and Herkimer. Heavy rains on the head waters and along the valleys of the smaller streams also caused destructive floods at a number of points in the State. The village of Deerfield Corners was inundated by a wave of water four or five feet in depth, which filled the houses with mud and water, swept away bridges and gardens, and left a deposit of several inches of silt and mud over the village. The damage in the village was estimated at $10,000.

The rainstorm of the 3d in Philadelphia, Pa., an account of which is reprinted from the report of the Pennsylvania Climate and Crop Section, T. F. Townsend, Director, merits the careful attention of municipal engineers and others having to do with the construction of drainage systems.

On August 3, between 10:50 a. m. and 12:35 p. m., the most terrific electrical and rain storm on record passed over the central portion of Philadelphia. Other than the dense black cloud which accompanied it, its approach was without special warning, as there were only slight changes in pressure, temperature, or wind velocity—the latter continued light during the storm.

The day began warm and sultry, with a thin, low-lying cloud overspreading the sky. At sunrise the heavens were luminous with a peculiar yellow light which gave a weird appearance to terrestrial objects. Light showers, amounting to 0.15 inch, occurred between 5:35 and 7 a. m. As the day advanced the sky brightened, and there was faint

sunshine for a little over an hour. Shortly after 10 a. m. the clouds began to thicken and darken, and soon necessitated the use of artificial light in buildings. At 10:50 a. m. both the electrical and rain storm burst with sudden fury and continued with but little variation in its intensity until 12:35 p. m. During this time the electrical forces of nature seemed centered over the city. Vivid and blinding flashes of lightning occurred in rapid succession, and these were followed by terrific crashes of thunder.

A number of buildings, towers, flagstaffs, etc., were struck by lightning, but probably owing to the heavy downpour of rain, no serious fires occurred, with the single exception of the destruction of the oil tanks at Point Breeze. One person, Mr. William Noble, was killed by lightning.

The following records of rainfall are from self-recording instruments:

*Weather Bureau Station, Ninth and Chestnut streets.*

Maximum rainfall for 5 min., 0.60 = 7.20 per hour.
Maximum rainfall for 10 min., 0.94 = 5.64 per hour.
Maximum rainfall for 1 hour, 3.81 = 3.81 per hour.
Total rainfall during storm, from 10:50 a. m. to 12:35 p. m., 5.43 inches.

The total rainfall was practically the same at the Pennsylvania Hospital and at the station of the voluntary observer in Camden, N. J. While the above 5 and 10-minute rainfalls have been exceeded at several stations of the Weather Bureau, according to the official records the one-hour rainfall of 3.81 inches is 1.26 inches more than the greatest maximum previously recorded by self-recording gauges at any station.

*Department of Surveys, Fifth and Wharton streets.*

Maximum rainfall for 15 min., 1.00 = 4.00 per hour.
Maximum rainfall for 1 hour, 2.50 = 2.50 per hour.
Total rainfall, 3 hours, 30 minutes, = 5.17 inches.

*Department of Surveys, Frankford avenue and Orthodox street.*

Maximum rainfall for 12 min., 0.50 = 2.50 per hour.
Maximum rainfall for 1 hour, 1.20 = 1.20 per hour.
Total rainfall, 3 hours, 1.75 inches.

The accumulation of water was so rapid in the lower districts as to produce a heavy hydraulic pressure in the city sewers, notwithstanding the relief afforded by open catch basins and manholes. As a result many buildings were flooded with water which flowed into them from the sewers through the drains and waste pipes, and was discharged from closets, basins, and sinks. The overflow from this source in some cases rose to the second floors.

The general movement of the storm, from west to east, was apparently interrupted after its center had passed a short distance north of the station, as it then circled toward the southeast and returned directly over the station before resuming its easterly course. This movement was accomplished with only a slight break in the intensity of the electrical display and heavy downpour of rain.

Peter Schall, No. 1618 Chadwick street, was drowned in a bakeshop cellar while trying to save property stored there.

*Average precipitation and departures from the normal.*

| Districts. | Number of stations. | Average. | | Departure. | |
|---|---|---|---|---|---|
| | | Current month. | Percentage of normal. | Current month. | Accumulated since Jan. 1. |
| | | *Inches.* | | *Inches.* | *Inches.* |
| New England | 10 | 4.78 | 120 | +0.80 | + 3.40 |
| Middle Atlantic | 12 | 6.01 | 130 | +1.40 | − 1.30 |
| South Atlantic | 10 | 8.81 | 129 | +2.00 | − 6.10 |
| Florida Peninsula | 7 | 10.23 | 167 | +4.10 | − 6.80 |
| East Gulf | 7 | 9.71 | 164 | +3.80 | − 8.80 |
| West Gulf | 7 | 3.05 | 84 | −0.60 | − 3.60 |
| Ohio Valley and Tennessee | 12 | 4.01 | 111 | +0.40 | + 0.30 |
| Lower Lake | 8 | 3.23 | 107 | +0.20 | − 0.80 |
| Upper Lake | 9 | 3.38 | 117 | +0.50 | − 0.70 |
| North Dakota | 7 | 1.72 | 81 | −0.40 | − 1.50 |
| Upper Mississippi | 11 | 3.36 | 110 | +0.30 | + 3.60 |
| Missouri Valley | 10 | 2.64 | 81 | −0.60 | + 2.70 |
| Northern Slope | 7 | 0.65 | 46 | −0.70 | − 0.60 |
| Middle Slope | 6 | 1.73 | 66 | −0.90 | + 2.30 |
| Southern Slope | 6 | 3.08 | 111 | +0.30 | − 0.90 |
| Southern Plateau | 13 | 1.85 | 106 | +0.10 | − 0.10 |
| Middle Plateau | 9 | 0.60 | 120 | +0.10 | − 1.10 |
| Northern Plateau | 11 | 0.49 | 136 | +0.10 | − 2.40 |
| North Pacific | 9 | 0.37 | 38 | −0.60 | − 5.80 |
| Middle Pacific | 5 | 0.01 | 100 | 0.00 | − 8.20 |
| South Pacific | 4 | T. | 100 | 0.00 | − 5.10 |

The geographic distribution of precipitation is shown on Chart III, and the numerical values for about 3,000 stations appear in Tables II and III, while the details as to excessive rains will be found in Table XI.

*In Canada.*—Prof. R. F. Stupart says:

The entire Province of British Columbia and a large portion of Ontario suffered from a deficiency of rain. In the former Province there were a few scattered showers, but at many points there was absolutely no rainfall, and in the latter Province it was more especially along the shores of Lake Ontario and northward from the west end of that lake to the Georgian Bay that the deficiency was very marked, while in the more eastern and northern counties the rainfall was well up to or even exceeded the average. Over most of Quebec there was a small deficency, as there also was in southwestern New Brunswick, but generally in the Maritime Provinces the rainfall was above the average, and to a large extent above in southern and western Nova Scotia. Some exceptionally heavy thunderstorms occurred in Ontario and New Brunswick. During the one on the 21st, in the counties of York and Ontario, five and a quurter inches of rain fell at Pickering.

## HAILSTORMS.

The following account of severe hailstorms has been compiled from press dispatches, reports of Climate and Crop section directors, and the statements of regular and voluntary observers:

2.—A hailstorm, in which the size of the stones varied from that of an egg to a large-sized apple, swept over Springer, N. Mex., on the night of the 2d. The force of the hailstones was so great that, in many cases, tin roofs were completely riddled.

14th.—A hailstorm, about 3 miles wide, struck the towns of Fairfax, Kertzonville, Russia, Hammond, Fanny, and Reis, Minnesota, at 6 p. m. The damage done by the storm was variously estimated at from one-third to three-quarters loss of the crops in the field. Very little insurance was carried in these towns.

A heavy hailstorm, about 2 miles wide, also crossed the northeastern portion of Brule County, S. D., doing considerable damage to windows, gardens, etc.

In Chamberlain Mr. Fred. C. Warnshuis, voluntary observer, picked up a hailstone measuring 8 inches in circumference. He states the hailstones were very hard and that some of them contained dust particles and small pieces of gravel.

A heavy hailstorm passed over a part of Noble County, Ohio, causing great damage to the tobacco crop. The losses were small in individual cases but the aggregate was a considerable sum.

Reports from Carrington, N. Dak., state that a hailstorm destroyed many thousand acres of grain in Foster and Eddy counties on the early morning of the 14th. Some of the fields were scarcely touched while a majority were injured from 20 to 50 per cent. A rough estimate places the damage at a loss of 20,000 acres.

16th.—Delaware, Ohio, was visited by a heavy hailstorm on the evening of the 16th. The fall of hail caused a general stampede of teams that were on the street, and many windows were broken.

17th.—A series of severe thunderstorms, and in some cases, accompanied by large hail (as large as walnuts), passed over eastern Massachusetts on the evening of the 17th. Hailstones 1½ inch in diameter were picked up in Boston. In the latter city the hail lasted but 5 minutes, being followed immediately by a heavy downpour of rain.

19th.—Gothenburg, Nebr., was visited by a severe wind and hail storm at 9 p. m. of the 19th. Nearly all of the windows on the north and east sides of the buildings were destroyed. In the country east of the town the damage was much greater, particularly over a strip of country from 3 to 5 miles wide in which hundreds of acres of corn were cut off close to the ground, wheat in the stack and shock was badly damaged and, in some cases, barns and buildings were completely demolished, owing to the severity of the wind.

There was also a severe hailstorm in Iowa, between Spencer and Emmetsburg, on the same date. The corn crop within an area about 10 miles wide and 15 to 20 miles long was almost totally destroyed.

24–25th.—Hailstorms of unusual severity occurred in various parts of central New York.

The following are the dates on which hail fell in the respective States:

Arizona, 3, 16, 19. Arkansas, 23, 24. California, 6. Colorado, 1, 2, 5, 6, 7, 8, 14, 17, 18, 23. Connecticut, 17. Idaho, 16. Illinois, 14, 15, 16, 26. Indiana, 15, 26. Iowa, 14, 16, 19. Kansas, 1. Maine, 17. Massachusetts, 17. Michigan, 3, 15, 16, 28. Minnesota, 14, 15. Mississippi, 18. Missouri, 15, 17, 27. Montana, 20, 21, 31. Nebraska, 12, 13, 15, 16, 17, 23, 25. Nevada, 5, 7, 15, 26. New Hampshire, 16, 24. New Jersey, 4, 17. New Mexico, 1, 6, 9, 23. New York, 1, 5, 12, 16, 22, 23, 24. North Carolina, 1, 4, 5. North Dakota, 14, 21, 22. Ohio, 2, 3, 8, 16, 17, 19, 24, 29, 30. Oklahoma, 17. Oregon, 29. Pennsylvania, 3, 16, 24. South Dakota, 14. Texas, 2. Utah, 3, 4, 15, 29, 30. Virginia, 7, 9. Wisconsin, 14, 15, 16, 22, 23. Wyoming 4, 6.

Hail was reported on the greatest number of dates in Colorado, 10; Ohio, 9; and New York and Nebraska, 7 each. There appears to have been less hail than during the preceding month.

## HUMIDITY.

The humidity observations of the Weather Bureau are divided into two series; the first or tridaily series began in 1871 and ended with 1887; the second or twice-daily series is continuous from 1888 to the present time.

The monthly means of the second or present series are based upon observations of the whirled psychrometer at 8 a. m. and 8 p. m., seventy-fifth meridian time, which corresponds to 5 a. m. and 5 p. m., Pacific; 6 a. m. and 6 p. m., Mountain; and 7 a. m. and 7 p. m., Central standard time.

Mean values computed from the first series are naturally not directly comparable with those of the second. In general the means of the first series are lower than those of the second, since they include an observation in the afternoon when the relative humidity of the air is near the minimum of the day. At stations in the western plateau region, however, the converse holds good, the means of the second series being lower than those of the first by amounts ranging from 0 to 10 per cent on the average of the year.

In the present state of knowledge respecting the diurnal variation in the moisture of the air, we are scarcely warranted in combining the two series in a general mean.

*The current month.*—Relative humidity was above the normal in all districts east of the Mississippi River; also in North Dakota, the northern Plateau and the southern Pacific coast. It was exactly normal in the Florida Peninsula and below normal in the remaining districts. The atmosphere was unusually humid in the Middle Atlantic States, the upper Mississippi Valley, the Ohio Valley and Tennessee. The departure from the normal, as will be seen by the table below, was more pronounced than has been the case in any month since the first of the year. While there have been but few fatalities from heat the bodily discomfort experienced in the large cities on the eastern seaboard during the month was very great.

In using the table by means of which the amount of moisture in the air is computed from the readings of the wet and dry bulb thermometers, the pressure argument has almost always been neglected, an omission that has little significance except for low temperatures and at high stations, such as Santa Fe, El Paso, Cheyenne, and a few others. The failure to apply a correction for the influence of the prevailing pressure on the psychrometer has the effect of making the monthly means of relative humidity at high-level stations too small by quantities ranging from 5 to 10 per cent. In the application of the monthly averages of the above table, or those of individual stations in Table I, to special inquiries, whether in the departments of biology, climatology, or sanitary science, this fact should be kept in mind. It should also be remembered that the hours at which observations in the Rocky Mountain Plateau region are made, viz, at 5 or 6 local mean time, morning and afternoon, give approximately the maximum and minimum values of the relative humidity for the day; probably the means of such hours approach more nearly the true mean of the month than is the case on the Atlantic seaboard and in the seventy-fifth meridian time belt.

*Average relative humidity and departures from the normal.*

| Districts. | Average. | Departure from the normal. | Districts. | Average. | Departure from the normal. |
|---|---|---|---|---|---|
| | % | | | % | |
| New England | 85 | + 3 | Missouri Valley | 67 | 0 |
| Middle Atlantic | 80 | + 5 | Northern Slope | 48 | − 3 |
| South Atlantic | 86 | + 4 | Middle Slope | 60 | − 1 |
| Florida Peninsula | 81 | 0 | Southern Slope | 59 | − 5 |
| East Gulf | 85 | + 5 | Southern Plateau | 43 | − 5 |
| West Gulf | 78 | + 4 | Middle Plateau | 31 | − 1 |
| Ohio Valley and Tennessee | 77 | + 6 | Northern Plateau | 44 | + 1 |
| Lower Lake | 75 | + 5 | North Pacific Coast | 77 | 1 |
| Upper Lake | 79 | + 5 | Middle Pacific Coast | 65 | + 3 |
| North Dakota | 64 | + 1 | South Pacific Coast | 64 | + 1 |
| Upper Mississippi Valley | 76 | + 6 | | | |

## SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 21 regular stations of the Weather Bureau by its photographic and at 47 by its thermal effects. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table IX for each hour of local mean time. In order to complete the record of the duration of cloudiness these registers are supplemented by special personal observations of the state of the sky near the sun for an hour after sunrise and before sunset, and the cloudiness for these hours has been added as a correction to the instrumental records, whence there results a complete record of the duration of sunshine from sunrise to sunset.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table IX for the stations at which instrumental self-registers are maintained.

The percentage of clear sky (sunshine) for all of the stations included in Table I, obtained as described in the preceding paragraph, is graphically shown on Chart VII. The regions of cloudy and overcast skies are shown by heavy shading; an absence of shading indicates, of course, the prevalence of clear, sunshiny weather.

The formation of fog and cloud is primarily due to differences of temperature in a relatively thin layer of air next to the earth's surface. The relative position of land and water surfaces often greatly increases the tendency to form areas of cloud and fog. This principle is perhaps better exemplified in the Lake region than elsewhere, although it is of quite general application. The percentage of sunshine on the lee shores of the Lakes is always much less than on the windward shores. Next to the permanent influences that tend to form fog and cloud may be classed the frequency of the passage of cyclonic areas.

*The current month.*—The geographic distribution of sun-

shine and, conversely, of cloudiness, is shown on Chart VII.

The two features that seem to call for special mention are the low percentage of sunshine in the South Atlantic region, particularly in Georgia, and the great excess of sunshine that obtained in Oklahoma and Kansas. It will be remembered that in the remarks on temperature mention was made of an area of high monthly mean temperature central in Kansas. The area of increased insolation, as determined by the distribution of sunshine, is considerably greater in extent than that of high temperature above referred to, the latter being wholly within and a little to the northeast of the center of the area of greatest insolation. The rainfall in this region, as also the cloudiness, was below normal, a combination of circumstances quite detrimental to agricultural interests. On the South Atlantic coast easterly to southeasterly winds prevailed, with thunderstorms and much rain. There were also several disturbances in the Gulf and off the coast of Florida and Georgia which tended to produce cloud and rain.

*Average cloudiness and departures from the normal.*

| Districts. | Average. | Departure from the normal. | Districts. | Average. | Departure from the normal. |
|---|---|---|---|---|---|
| New England | 5.8 | +0.8 | Missouri Valley | 3.3 | −0.8 |
| Middle Atlantic | 5.1 | +0.1 | Northern Slope | 3.6 | −0.1 |
| South Atlantic | 6.1 | +0.9 | Middle Slope | 2.7 | −1.1 |
| Florida Peninsula | 4.6 | −0.6 | Southern Slope | 3.2 | −1.6 |
| East Gulf | 6.3 | +1.4 | Southern Plateau | 3.3 | −0.1 |
| West Gulf | 4.6 | +0.2 | Middle Plateau | 3.3 | +1.1 |
| Ohio Valley and Tennessee | 4.5 | 0.0 | Northern Plateau | 2.7 | −0.3 |
| Lower Lake | 5.7 | +1.2 | North Pacific Coast | 4.8 | +0.9 |
| Upper Lake | 5.1 | +0.3 | Middle Pacific Coast | 3.8 | +1.0 |
| North Dakota | 3.3 | −0.6 | South Pacific Coast | 2.5 | 0.0 |
| Upper Mississippi Valley | 4.3 | +0.2 | | | |

## WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

*Maximum wind velocities.*

| Stations. | Date. | Velocity. | Direction. | Stations. | Date. | Velocity. | Direction. |
|---|---|---|---|---|---|---|---|
| Buffalo, N. Y. | 3 | 51 | sw. | Havre, Mont | 3 | 54 | nw. |
| Charleston, S. C | 30 | 52 | e. | Do. | 21 | 60 | sw. |
| Chicago, Ill. | 16 | 72 | sw. | Pierre, S. Dak. | 5 | 60 | nw. |
| Do. | 15 | 60 | sw. | Savannah, Ga. | 31 | 76 | nw. |

## LOCAL STORMS.

2d–3d.—A Gulf hurricane having a comparatively narrow track struck the Florida coast at Apalachicola about midnight of the 2d. The velocity of the wind for a time was estimated at 80 miles per hour, and considerable damage was done to vessel property. The tug *Ocean Gem* was wrecked, becoming a total loss, three other tugs were sunk and a number of sailboats were damaged. The casualties of the storm in the Gulf were as follows: Tug *Keyser* foundered 15 miles off Cape San Blas with a loss of three lives; the dredge *Herndon* was cut adrift when the *Keyser* went down and afterward foundered with the loss of one life. The hurricane passed inland and broke up into general rains in western Florida and southeastern Alabama.

3d.—A severe local storm visited Sandusky, Ohio, at 3:35 p. m., partially wrecking a few buildings and damaging many others. One building was completely wrecked, involving a loss of $5,000; other losses, not including destruction of shade trees and crops, will aggregate at least as much.

A severe electrical storm occurred at Philadelphia, Pa., during the forenoon of the 3d. (See precipitation, page 347.)

14–15th.—A tornado moving in a southeasterly direction passed about 2½ miles west of Gary, S. Dak., at 6:30 p. m., central time. The path of great destruction was not continuous over the entire track of the storm (about 15 miles). Eight persons were killed (5 in one house) and 6 were injured. The loss to buildings was about $7,000; crops, live stock and farm machinery, $13,000.

Winds of almost hurricane force were reported in the vicinity of Minot, N. Dak., and severe local disturbances prevailed in Minnesota and Wisconsin. Gales on Lake Michigan the night of the 15th endangered several of the larger craft, partially dismantled the schooners *Ida Olsen* and *Butcher Boy*, and sunk two yachts in the harbor of Chicago where a squall wind of 72 miles per hour was registered.

16th.—A minor tornado passed through the country east of Fairbank, Fayette County, Iowa, about 5 p. m., destroying a few farm buildings and some live stock. No loss of human life.

17th.—Severe thunder and hail storms occurred in Massachusetts, Rhode Island and Connecticut. In the vicinity of Boston much damage was done by lightning and 2 persons were killed. Grain in the field, trees, chimneys, etc., were somewhat damaged by the wind squalls which preceded these storms.

19th.—A series of severe wind and thunderstorms swept over the northwestern portion of Iowa on the evening of the 19th. The storms were first noted in Jackson County, Minn., and extended southeastward into and through the first two tiers of counties in Iowa. Within this belt there were many local wind squalls of much severity, the wind being strong enough to overturn freight cars and demolish frail structures. Two fatalities occurred near Petersburg, a few miles north of Superior. A barn, in which a man and his wife were living, was blown to pieces, killing both occupants. There was no funnel cloud nor other evidence of whirling. The minimum value of property destroyed was about $25,000.

24th.—A remarkably violent series of thunderstorms occurred in a region extending from western Pennsylvania to eastern Massachusetts on the afternoon of the 24th. The electrical discharges were extraordinarily frequent and brilliant. Thirty-eight persons were struck by lightning of whom 9 were killed; a large number of buildings were also struck.

25th.—Thunderstorm activity was renewed the next day (the 25th) in New York, Pennsylvania, and New England, in which region 22 persons were struck, 11 being killed.

31st.—A tropical storm struck the coast of Georgia in the neighborhood of Savannah, August 31, and while there was no loss of life the damage to property will aggregate close to half a million dollars. The storm began early on the night of the 30th and raged with increasing violence until about 8 a. m. of the 31st. Probably 100 buildings were wholly or partially unroofed and as many others damaged in other ways. The storm was not so severe in the sea islands as the great storm of 1893. The beaches north of Tybee, however, were lined with wrecks of small craft, and at Bluffton and the small settlements near by nearly all of the houses were unroofed and many were destroyed. The Norwegian bark *Ragna*, which went ashore on Gaskin Bank, is a total wreck. The bark *Noe* was wrecked and has about disappeared. This is the vessel in which Lieutenant Morgan and one of his companions lost their lives in attempting to rescue the crew. The loss to the rice crop on the Savannah River is estimated at $200,000.

The steam pilot boat *J. H. Estill*, which arrived in Tybee Roads on the night of September 2, after a cruise of a day and a night, reported six wrecks of coastwise schooners off Martin's Industry Lightship, 15 miles from Tybee. Several of them were sunk, others bottom upward, and all of them apparently having been anchored when the storm struck them. The storm was not felt except within a comparatively short distance from the Savannah River, and nearly as much damage was done by water as by wind.

### WATERSPOUTS ON THE GREAT LAKES.

The following description of a number of waterspouts observed on Lake Erie, August 13, 1898, is taken from the Marine Record of Cleveland, Ohio, August 25, 1898:

We cleared from Ashland with ore, and on Saturday morning were about 20 miles east of the Dummy. There was a 10-knot breeze, and the sun was shining as bright as could be. The captain was at the wheel and had her course laid due east, calculating to touch Ashtabula. About 8 o'clock I noticed a black cloud forming on the starboard quarter. It kept growing bigger and blacker, and rising higher and higher. It seemed to gain on the ship, and we began making preparations for a blow. In a little while the cloud was to our bow, racing along on a parallel course, but not going up into the sky far enough to obscure the sun. Then a peculiar thing happened. A portion of the cloud seemed to drop down toward the water. The section was forked like the tail of a fish, and it dropped lower and lower until it nearly reached the water. Then the lake directly under it began to boil. We could see the water whirling round and round, and then begin to rise to meet the descending cloud. Then they came together and the cloud seemed to rise up again, taking tons and tons of water along with it. We had none of us ever seen a waterspout before, but we knew this was the genuine article. The spout appeared to be about 10 feet in diameter and connected the great cloud and the lake like a big cable. It was black as the cloud and seemed to be surrounded by a heavy mist, which, after a little, when the strange freak got nearer, we found was descending water, falling like the spray from a fountain. All the time the sun was shining and the falling mist was turned into a rainbow that danced and flashed about the column of water in a way that I can't describe. It was the prettiest sight I've ever seen.

But it wasn't long before another part of the cloud began to descend and another section of the lake to boil and rise, and pretty soon there was another waterspout racing alongside of the *Forbes*, a bit closer than the first, and we began to think it inclined to be a trifle too familiar. Right along on our starboard side the two black fellows raced, and worse yet, another and another was formed, until seven of the big columns of black water were waltzing and swaying along, some pretty close to the ship, others farther away toward the southward. Sometimes the columns of water would move along as stiff and straight as a squad of soldiers, and then they would begin to stagger and swing around like a lot of drunken fellows trying to do a cake-walk. All the time the water for 100 feet about the base of each pillar was churned into a white foam, and I tell you it was an awful sight. There would not have been a ghost of a show for any lake vessel once in among the racing columns of water, and we were moving along right at the edge in a parallel direction, not knowing at what minute the wind would veer and send them all in our direction.

Our greatest fear was that the big fellows, in their crazy gyrations, might collide and go to pieces. Were they to do so it meant a sudden fall of tons upon tons of water, and if the *Forbes* should be in the path of the descending flood, you can guess what the result would be. After a while the first waterspout began to disappear, just as it had formed, the cloud at that point settling lower and lower, then separating from the lower part of the column, and rising away again, while where it had been the water once more became comparatively quiet.

One by one they disappeared, and we were beginning to congratulate ourselves upon our good fortune, when I saw the captain turn the wheel sharp. What do you think? Why, there, dead ahead, and nearer than any of the others, was the king pin of all. It looked to be half a mile in diameter, but wasn't black like the others, having more the appearance of a big waterfall.

We just naturally concluded we could see our finish then. You know sailors are superstitious, and I guess some of them thought the Falls had taken a move up the lake since the last trip down, from what they said.

The wind seemed to slacken a bit, and that helped us, for the big waterspout did not move as rapidly as the others had, and it was soon well to starboard, and thus we gradually worked away from it. That, too, shortly afterward began to disappear as the smaller ones had done, and in an hour and a half from the time the cloud had first appeared, it and the cables it had picked up, as if to tow itself along, had all disappeard and the sky was as clear as before.

Capt. James Montgomery, master of the *Kittie M. Forbes*, was asked his impressions of the peculiar lake phenomenon. He corroborated the main details of the mate's story, and declared that he had never seen anything to equal the spectacle presented by this strange freak.

I've heard a great many lake men tell of seeing waterspouts here, but I always gave them a grain of allowance. I supposed they were only found on the ocean, but I can back up their stories with my own experience now.

I must confess that I was a bit scary of the big fellow dead ahead of us, for I had heard that those strange formations burst sometimes, and I knew the *Kittie M.* would be sure to go down should that mass of water fall upon her. I think that prompt action in sheering to the northward prevented a collision, and probably the fact that the wind eased up aided our escape.

I counted seven of the waterspouts, and it was more than an hour and a half from the time we saw the first one until the last had disappeared. They were of varying size, from that of a man's body to that of a house. They seemed to extend from the surface of the lake into the clouds.

In a letter to First Mate Reynolds inquiry was made as to the location of the spouts and the date of their occurrence. His reply is, in part, as follows:

We were about 15 or 20 miles east-northeast of the Dummy or Point Pelee Light on Lake Erie when the black cloud began to move from a north-northeasterly to a southwesterly direction on the morning of August 13, 1898. On that date, between 7:30 a. m. and 9:00 a. m., we saw seven full-fledged waterspouts. The greatest of these appeared to be directly in our course, so we turned out and passed about half a mile from it. Although the others were some distance away they were plainly seen, as the day was clear.

The Weather Map of August 13 (7 a. m. central time) shows an area of low pressure, central over the mouth of the St. Lawrence. The weather at all stations on Lakes Erie and Huron was clear, with light winds, pressure between 30.10 and 30.20.

Two points in the description given by Mate Reynolds are of especial interest, viz, the direction in which the spouts progressed and the fact that the weather was clear. It is quite generally believed that tornadoes and waterspouts are closely allied phenomena. The direction of movement in a tornado is almost invariably from southwest to northeast or a direction almost exactly contrary to that taken by the waterspouts observed by Mate Reynolds. Tornadoes rarely, if ever, form under the conditions of temperature, pressure, and humidity that obtained over Lake Erie on the morning of August 13.

The impression that the vessel would be swamped in case the spout broke over her was a natural though erroneous one. Little water is carried up in waterspouts, contrary to a somewhat general belief. The danger to a vessel coming into actual contact with a waterspout would be from the whirling winds rather than the water.

### ATMOSPHERIC ELECTRICITY.

*Thunderstorms.*—Four thousand eight hundred and fifty-three reports of thunderstorms were received during the current month as against 4,260 in 1897, and 5,376 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 17th, 319; 24th, 291; 23d, 277; 18th, 258; 16th, 255.

Reports were most numerous from New York, 310; Ohio, 296; Pennsylvania, 249; Colorado, 221.

*Auroras.*—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from 1st to 5th, and 26th to 31st.

The greatest number of reports were received for the following dates: 16th, 8, and 12th, 7.

Reports were most numerous from Wisconsin, 8; Montana, 6.

*In Canada.*—Auroras were reported as follows: St. Johns, 18; Father Point, 14, 17, 19, 22; Quebec, 16, 17, 18, 19, 26;

White River, 26; Minnedosa, 12, 13, 15, 16, 17; Qu'Appelle, 6; Swift Current, 15; Prince Albert, 24; Banff, 16.

Thunderstorms were reported as follows: St. Johns, 23, 31; Halifax, 23, 25; Grand Manan, 17, 22; Bermuda, 12, 14, 20, 22, 23, 26; Yarmouth, 25; Charlottetown, 9, 10; Father Point, 6, 16, 17; Quebec, 4, 9, 13, 16, 17, 22; Montreal, 12, 16, 29; Rockliffe, 3; Toronto, 3, 11, 12, 16, 21, 23, 24; White River, 4, 5, 11, 20, 28, 31; Ottawa, 16, 29, 31; Port Stanley, 3, 7, 8, 11, 12, 16, 24; Saugeen, 15, 25; Parry Sound, 3, 11, 25, 28; Port Arthur, 28, 31; Winnipeg, 14, 15, 16, 24, 28; Minnedosa, 4, 18, 19, 22; Qu'Appelle, 14; Medicine Hat, 1, 3, 4, 5, 14, 21, 28; Swift Current, 3, 4, 11, 17, 22, 31; Kamloops, 3; Prince Albert, 8, 20; Battleford, 8; Esquimalt, 15; Banff, 2, 3, 8, 11, 19, 21.

## CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Rainfall is expressed in inches.

*Alabama.*—The mean temperature was 78.7°, or about normal; the highest was 102°, at Pineapple on the 24th, and the lowest, 59°, at Florence on the 24th. The average precipitation was 7.43, or 3.11 above normal; the greatest monthly amount, 17.48, occurred at Alco, and the least, 1.02, at Riverton.—*F. P. Chaffee.*

*Arizona.*—The mean temperature was 81.9°; the highest was 124°, at Fort Mohave on the 10th, and the lowest, 41°, at Fort Defiance on the 11th. The average precipitation was 3.01; the greatest monthly amount, 8.51, occurred at Calabasas, and the least, 0.19, at Yuma.—*W. G. Burns.*

*Arkansas.*—The mean temperature was 79.4°, or 0.6 above normal; the highest was 104°, at Lonoke on the 23d, and the lowest, 55°, at Fayetteville on the 4th. The average precipitation was 4.35, or 1.01 above normal; the greatest monthly amount, 8.42, occurred at Jonesboro, and the least, 1.86, at Conway.—*E. B. Richards.*

*California.*—The mean temperature was 74.5°, or normal; the highest was 124°, at Volcano Springs on the 14th, and the lowest, 23°, at Bodie on the 3d. The average precipitation was 0.02, or 0.03 below normal; the greatest monthly amount, 0.99, occurred at Edgewood, while no rain fell at more than half of the stations.—*W. H. Hammon.*

*Colorado.*—The mean temperature was 66.9°, or 2.3° above normal; the highest was 107°, at Delta on the 14th, and the lowest, 29°, at Wagon Wheel Gap on the 2d, and at Breckenridge on the 10th. The average precipitation was 1.48, or 0.27 below normal; the greatest monthly amount, 3.62, occurred at Yuma, and the least 0.14 at Crook.—*F. H. Brandenburg.*

*Florida.*—The mean temperature was 80.8°, or slightly below normal; the highest was 97°, occurring at several stations on different dates; the lowest was 58°, at St. Andrews Bay on the 7th. The average precipitation was 12.96, or about 6.50 above normal; the greatest monthly amount, 31.26, occurred at St. Andrews Bay, and the least, 5.34, at Sebastian.—*A. J. Mitchell.*

*Georgia.*—The mean temperature was 78.5°, or about normal; the highest was 99°, at Millen on the 25th, and the lowest, 59°, at Diamond on the 13th. The average precipitation was 10.09, or 4.66 above normal; the greatest monthly amount, 28.70, occurred at Fleming, and the least, 2.45, at Greenbush.—*J. B. Marbury.*

*Idaho.*—The mean temperature was 69.1°; the highest was 110°, at Payette on the 11th, and the lowest, 31°, at Swan Valley on the 23d. The average precipitation was 0.51; the greatest monthly amount, 1.44, occurred at Burnside, and the least, trace, at Downey and Idaho City.—*D. P. McCallum.*

*Illinois.*—The mean temperature was 73.8°, or 0.3 above normal; the highest was 100°, at Martinsville on the 22d, and at New Burnside on the 24th, and the lowest, 45°, at Lanark and Scales Mound on the 12th, and at Kishwaukee on the 13th. The average precipitation was 4.41 or 1.69 above normal, and was very unevenly distributed, over 10.00 falling at Laharpe and Knoxville, while less than 2.00 fell at several stations.—*C. E. Linney.*

*Indiana.*—The mean temperature was 74.2°, or 0.8° above normal; the highest was 99°, at Boonville on the 23d, and at Vincennes and Washington on the 24th, and the lowest, 46°, at Winamac on the 5th. The average precipitation was 3.36, or 0.35 above normal; the greatest monthly amount, 6.85, occurred at Jasper, and the least, 0.94, at Greensburg.—*C. F. R. Wappenhans.*

*Iowa.*—The mean temperature was 71.2°, or nearly normal; the highest was 103°, at Clarinda and Council Bluffs on the 20th, and the lowest, 40°, at Britt on the 1st. The average precipitation was 3.44, being very unequally distributed; the greatest monthly amount, 10.55, occurred at Bonaparte, and the least, 0.58, at Adair.—*G. M. Chappel.*

*Kansas.*—The mean temperature was 78.2°, or 1.9° above normal; the highest was 108°, at Eureka Ranch on the 20th, at Minneapolis on the 29th, and at Meade on the 31st; the lowest was 46° at Frankfort on the 1st. The average precipitation was 2.46, or 0.63 below normal; the greatest monthly amount, 6.30, occurred at Osage City, while none fell at Hoxie.—*T. B. Jennings.*

*Kentucky.*—The mean temperature was 76.7°, or 1.3° above normal; the highest was 100°, at Paducah and Russellville on the 23d, and the lowest, 55°, at Princeton on the 12th, at Loretto on the 19th, and at Maysville and Owenton on the 28th. The average precipitation was 3.82, or 0.64 above normal; the greatest monthly amount, 9.86, occurred at Alpha, and the least, 1.10, at Woodburn.—*G. E. Hunt.*

*Louisiana.*—The mean temperature was 81.0°, or 0.3° above normal; the highest was 102°, at Liberty Hill on the 18th and 23d, and the lowest, 58°, at Minden on the 31st. The average precipitation was 6.26, or 1.30 above normal; the greatest monthly amount, 14.39, occurred at Venice, and the least, 1.39, at Como.—*A. G. McAdie.*

*Maryland and Delaware.*—The mean temperature was 75.9°, or 2.0° above normal; the highest was 98°, at Boettcherville, and Laurel, Md., on the 31st, and the lowest, 46°, at Deerpark, Md., on the 28th. The average precipitation was 6.27, or 3.79 above normal; the greatest monthly amount, 10.61, occurred at Receiving Reservoir, D. C., and the least, 2.81, at Annapolis, Md.—*F. J. Walz.*

*Michigan.*—The mean temperature was 67.4°, or 1.5° above normal; the highest was 101°, at Owosso on the 23d, and the lowest, 28°, at Newberry on the 19th. The average precipitation was 2.88, or 0.36 below normal; the greatest monthly amount, 5.92, occurred at Gladwin, and the least, 0.75, at Mount Clemens.—*C. F. Schneider.*

*Minnesota.*—The mean temperature was 66.9°, or about normal; the highest was 102°, at Wabasha on the 31st, and the lowest, 33°, at Roseau on the 17th. The average precipitation was 3.22, or about 0.75 above normal; the greatest monthly amount, 6.17, occurred at Montevideo, and the least, 0.86, at Morris.—*T. S. Outram.*

*Mississippi.*—The mean temperature was 80.4°, or 0.4° above normal; the highest was 105°, at Columbus on the 23d, 24th, and 29th, and the lowest, 59°, at French Camp on the 14th. The average precipitation was 5.97, or 2.01 above normal; the greatest monthly amount, 16.95, occurred at Mosspoint, and the least, 1.83, at Greenwood.—*R. J. Hyatt.*

*Missouri.*—The mean temperature was 75.6°, or about 1.0° above normal; the highest was 103°, at Jefferson City on the 23d, and the lowest, 44°, at Potosi on the 5th. The average precipitation was 3.01, or about normal; the greatest monthly amount, 7.20, occurred at Oto, and the least, 0.40, at Bolckow.—*A. E. Hackett.*

*Montana.*—The mean temperature was 68.0°, or 1.6° above normal; the highest was 105°, at Glendive on the 21st, and the lowest, 31°, at Adel on the 23d. The average precipitation was 0.66, or about normal; the greatest monthly amount, 1.38, occurred at Columbia Falls, and the least, 0.09, at Poplar.—*E. J. Glass.*

*Nebraska.*—The mean temperature was 74.2°, or about normal; the highest was 109°, at Camp Clarke on the 21st, and the lowest, 42°, at Lodgepole on the 9th. The average precipitation was 2.24, or about 0.33 below normal; the greatest monthly amount, 6.85, occurred at Callaway, while none fell at Lodgepole.—*G. A. Loveland.*

*Nevada.*—The mean temperature was 73.6°, or about 1.0° above normal; the highest was 112°, at St. Thomas on the 11th, and the lowest, 29°, at Blaine on the 31st. The average precipitation was 0.45, or 0.04 above normal; the greatest monthly amount, 2.85, occurred at Ely, while none fell at a number of stations.—*R. F. Young.*

*New England.*—The mean temperature was 69.6°, or 2.7° above normal; the highest was 95°, at Plymouth, N. H., on the 4th, and the lowest, 33°, at Flagstaff, Me., on the 12th. The average precipitation was 5.67, or 1.62 above normal; the greatest monthly amount, 11.89, occurred at Jefferson, Mass., and the least, 0.70, at North Conway, N. H.—*J. W. Smith.*

*New Jersey.*—The mean temperature was 74.8°, or 2.7° above normal; the highest was 98°, at Imlaystown on the 31st, and the lowest, 42°, at Charlotteburg on the 28th. The average precipitation was 5.36, or 1.52 above normal; the greatest monthly amount, 9.28, occurred at Camden, and the least, 2.70, at Barnegat Lighthouse.—*E. W. McGann.*

*New Mexico.*—The mean temperature was 71.0°, or 2.6° below normal; the highest was 99° at Gila on the 14th, and the lowest, 34°, at Winsors on the 26th. The average precipitation was 2.27, or 0.28 below

normal; the greatest monthly amount, 4.77, occurred at Laluz, and the least, 0.17, at Lordsburg.—*R. M. Hardinge.*

*New York.*—The mean temperature was 70.3°, or 2.5° above normal; the highest was 94°, at Brentwood on the 8th, and at Penn Yan, Waverly, Wedgewood, and Willets Point on the 31st; the lowest was 35°, at New Lisbon, and South Kortright on the 28th. The average precipitation was 6.07, or 2.34 above normal; the greatest monthly amount, 13.79, occurred at Littlefalls, and the least, 2.10, at Appleton—*R. G. Allen.*

*North Carolina.*—The mean temperature was 77.2°, or about 1.5° above normal; the highest was 98°, at Sloan on the 1st, and the lowest, 52°, at Linville on the 5th. The average precipitation was 7.94, or 2.16 above normal; the greatest monthly amount, 16.93, occurred at Horse Cove, and the least, 3.12, at Kittyhawk.— *C. F. von Herrmann.*

*North Dakota.*—The mean temperature was 65.4°, or 0.7° below normal; the highest was 104°, at Dickinson on the 15th, and at Medora on the 20th, and the lowest, 24°, at Fort Yates on the 12th. The average precipitation was 1.84, or 0.26 below normal; the greatest monthly amount, 4.05, occurred at Wahpeton, and the least, trace, at Glenullin and Medora.—*B. H. Bronson.*

*Ohio.*—The mean temperature was 73.5°, or 2.2° above normal; the highest was 100°, at Seaman on the 31st, and the lowest, 40°, at Bement on the 28th. The average precipitation was 4.50, or 1.65 above normal; the greatest monthly amount, 9.06, occurred at Clarksville, and the least, 1.38, at Montpelier.—*J. Warren Smith.*

*Oklahoma.*—The mean temperature was 78.9°; the highest was 107°, at Kemp on the 22d, and the lowest, 52°, at Anadarko on the 13th. The average precipitation was 3.26; the greatest monthly amount, 8.97, occurred at Newkirk, while none fell at Beaver.—*J. I. Widmeyer.*

*Oregon.*—The mean temperature was 68.2°, or 2.3° above normal; the highest was 119°, at Pendleton on the 10th, and the lowest, 30°, at Prineville on the 30th. The average precipitation was 0.36, or 0.01 below normal; the greatest monthly amount, 1.94, occurred at Ashland, and the least, trace, at several stations.—*B. S. Pague.*

*Pennsylvania.*—The mean temperature was 72.3°, or 2.8° above normal; the highest was 99°, at Derry Station on the 8th, and the lowest, 37°, at Dushore on the 20th. The average precipitation was 6.60, or 2.45 above normal; the greatest monthly amount, 11.32, occurred at Girardville, and the least, 3.72, at Scranton.—*T. F. Townsend.*

*South Carolina.*—The mean temperature was 78.7°, or about normal; the highest was 99°, at Batesburg on the 25th, and the lowest, 57°, at Clemson College on the 4th. The average precipitation was 9.81, or 3.68 above normal; the greatest monthly amount, 24.68, occurred at Port Royal, and the least, 4.28, at Gaffney.—*J. W. Bauer.*

*South Dakota.*—The mean temperature was 71.0°, or about normal; the highest was 110°, at Shiloh on the 27th, and the lowest, 32°, at Rochford on the 24th. The average precipitation was 1.21, or 1.28 below normal; the greatest monthly amount, 3.00, occurred at Chandler, and the least, 0.05, at Spearfish.—*S. W. Glenn.*

*Tennessee.*—The mean temperature was 76.9°, or slightly above normal; the highest was 99°, at Savannah on the 24th, and the lowest, 50°, at Erasmus on the 29th. The average precipitation was 4.00, or slightly above normal; the greatest monthly amount, 8.32, occurred at Carthage, and the least, 0.83, at Chattanooga.—*H. C. Bate.*

*Texas.*—The mean temperature for the State during the month, determined by comparison of 36 stations distributed throughout the State, was 0.5° above the normal. There was a slight deficiency in temperature over west Texas and the east coast district. It was about normal over the western portion of the coast district and the panhandle, while there was a general excess over the other portions of the State, with the greatest, 3.4°, in the vicinity of Hearne. The highest was 106°, at Rhineland on the 18th, and the lowest, 49°, at Midland on the 15th. The average precipitation for the State, during the month, determined by comparison of 38 stations distributed throughout the State, was 0.18 below the normal. There was a slight deficiency over west, central, and southwest Texas, and it ranged from 1.07 to 2.63 below normal over the west coast district. The precipitation was generally above the normal over other portions of the State, with the greatest excess over north Texas, where it ranged from 1.28 to 3.18, with the greatest in the vicinity of Gainesville. The greatest monthly amount, 7.77, occurred at Brazoria, and the least, trace, at Corpus Christi and Point Isabel.—*I. M. Cline.*

*Utah.*—The mean temperature was 73.5°, or about 3.0° above normal; the highest was 110°, at St. George on the 11th, and the lowest, 26°, at the same station on the 4th. The average precipitation was 0.60, or slightly below normal; the greatest monthly amount, 1.50, occurred at Pareah, and the least, trace, at Promontory—*J. H. Smith.*

*Virginia.*—The mean temperature was 76.2°, or about 2.0° above normal; the highest was 99°, at Doswell on the 1st, and the lowest, 51°, at Burkes Garden on the 27th, 28th, and 30th. The average precipitation was 5.48, or 1.89 above normal; the greatest monthly amount, 10.61, occurred at Charlottesville, and the least, 1.25, at Tobaccoville.—*E. A. Evans.*

*Washington.*—The mean temperature was 68.0°, or 2.7° above normal; the highest was 115°, at Kennewick on the 10th, and the lowest, 37°, at Blaine on the 15th. The average precipitation was 0.48, or slightly below normal; the greatest monthly amount, 1.43, occurred at Fort Spokane, and the least, 0.01, at Lyle.—*G. N. Salisbury.*

*West Virginia.*—The mean temperature was 73.7°; the highest was 96°, at Bluefield on the 24th, and the lowest, 44°, at Morgantown and Oldfields on the 28th. The average precipitation was 7.51, or about 3.50 above normal; the greatest monthly amount, 11.57, occurred at Philippi, and the least, 4.40, at Green Sulphur Springs.—*C. M. Strong.*

*Wisconsin.*—The mean temperature was 67.3°, or nearly normal; the highest was 99°, at Spooner on the 31st, and the lowest, 30°, at North Crandon on the 27th. The average precipitation was 3.20, or 0.58 above normal; the greatest monthly amount, 6.02, occurred at Whitemound, and the least, 0.23, at Eau Claire.—*W. M. Wilson.*

*Wyoming.*—The mean temperature was 67.9°, or 1.3° above normal; the highest was 105°, at Bittercreek on the 10th, and the lowest, 32°, at the same station on the 25th. The average precipitation was 0.82, or 0.07 below normal; the greatest monthly amount, 2.05, occurred at Fort Yellowstone, and the least, trace, at Otto.—*W. S. Palmer.*

## SPECIAL CONTRIBUTIONS.

### HANN'S HANDBOOK OF CLIMATOLOGY.

By Prof. M. W. HARRINGTON.

The second edition of this handbook of climatology bears evidence of the well-known industry and care of its learned author. Reductions of the extensive observations of others are given in very condensed form, requiring many hours for their preparation, and the book is filled with similar evidences of painstaking condensation from all sources. There is no evidence of a reduction of Professor Hann's activity, though past middle life, for this edition is fully one-half larger than the first edition, issued fifteen years ago.

It is about ten years since the Atlas of Meteorology was contributed by the same author as a part of the new edition of Berghaus' great Physical Atlas. A keen judgment of both the consistency of climatology and the accuracy of this book can be made by comparing the graphic delineations of ten years ago with the printed statements in the book. On trying it for a certain tropical island of great interest just now to the United States, it was found that the consistency of the two was great, though not absolute. It was near enough to show that our knowledge of the climate of the earth has been already worked out into a systematic web of woof and warp, where only the finer details are to be filled in hereafter. Yet it remains true that there are large parts of the earth's surface where an increase in our knowledge is much needed. Doctor Hann laments especially the scantiness of observations over the greater part of South America. Though the continent is covered by a series of civilized states, yet only southern Brazil, Argentina, and Chile have a regular system of observations, while elsewhere we must depend on the statements of travelers and an occasional series of observations by immigrants of scientific tastes. According to the author, Africa is better covered by the observed facts of climate than is the most of South America. The information from central Africa is, however, still scanty, as is that from the eastern Sahara and the eastern horn of the continent. In Asia our sources of information are more abundant, but observations from Thibet and interior China are yet very meager.

In the West Indies the information is much more complete, and Jamaica is as well known climatologically as most of the States of the Union. Many of the other islands have each a station with a series of years of observations behind it. Hawaii has long had systematic meteorological observers, and since 1890 has had its own weather bureau, under the surveyor general. In the Philippines we have yet only the

regular observations at Manila and a few scattered series due to Karl Semper thirty or forty years ago.

The handbook consists of three volumes, aggregating nearly 1,400 pages. The first volume is introductory, and relates to the elements of climate most worthy of observation and reduction, and to the different leading forms of climate, such as land climate, sea climate, and alpine climate, and under each is discussed the particular problems of general character that relate to it. It is to be noted that the idea of monsoons and monsoonal influences are decidedly extended in this edition, and the impression produced in going over it is strong that the monsoonal exchange plays a more important part in explaining the general phenomena of rainfall outside the regions habitually traversed by general storms than has heretofore been taken for granted. The second volume is devoted to tropical climate, and the third to that of the temperate and polar zones. The work of American meteorologists is copiously used, and in an appreciative way, and Dr. Hann always has a good word to say for the lonely settler of scientific tastes in the less frequented parts of the world who has the courage and industry to devote his leisure time to adding his contribution to the settlement of these world-wide problems. The entire work is a thorough, painstaking, and well digested compendium of what is known about the climates of the world, and there is no other book on the subject to compare with it. It is to be hoped that the amiable and learned author will live to issue several more editions of the work.

## THE EFFECT OF APPROACHING STORMS UPON SONG BIRDS.

By CHARLES E. LINCEY, Section Director (dated September 12, 1898).

During the night of the 15–16th of August, 1898, very severe electrical, wind, and rain storms prevailed over the northern district of Illinois, reaching their greatest severity in Henry, Knox, Stark, and Bureau counties. The edges of the storm, however, spread eastward to Lake Michigan, northward to Wisconsin, and southward to Warren, Peoria, and Woodford counties.

A large number of my crop correspondents and voluntary observers commented on the extreme severity of the storm, the large amount of water which fell (in many cases exceeding 5 inches), and the heavy, constant, and near display of thunder and lightning. Among the card comments received was one from Mr. W. W. Warner, of Warner, Henry County, Ill., a station which was right in the midst of the most severe portion of the storm area. Mr. Warner said:

> Five and one-half inches of rain fell during eight hours of Monday night (15th) last. * * * It was a great electrical storm. * * * We have lots of birds, wild singers; for forty-eight hours before the great electrical storm not a sound was heard from our wild birds.

This statement in regard to the effect of the approaching storm upon the wild song birds was so full of interest that I wrote to Mr. Warner for additional information, supplementing it by a letter of inquiry to about twenty-five other reporters and observers scattered throughout the area covered by the storms.

Mr. Warner's reply to my letter requesting particulars contains the following:

> Replying to your favor of the 24th instant, in regard to the effect of storms on birds, I would say that I am the owner of some 1,200 acres here on which I allow no hunting; consequently I have lots of birds, friendly wild birds. My house is in a park of about 50 acres of mostly natural growth trees.
>
> The birds commence singing about daylight; several of the scarlet tanagers, which are quite tame, usually lead, and I think in no place in this climate have I heard so many and so great a variety of song birds as here, more in the morning, but usually continuing during most of the day.
>
> I have been in monsoons, hurricanes, etc., but the storm of the 15–16th, I think, exceeded anything I ever saw in the heavy and continuous thunder and vivid flashes of lightning. It lasted nearly eight hours, and some rain gauges showed 6.0 to 6.5 inches of rain.
>
> The day previous to the storm it was very still, with hot air, and I remarked to several: "Have you heard any birds?" etc. "Are we going to have a big storm or an earthquake?"
>
> I have traveled over 200,000 miles, looking over this planet, and on several occasions have observed the wild birds being silent before storms—electrical storms—and before earthquakes, volcanic eruptions, etc.
>
> In the first part of May, 1893, I was in Ceylon. Birds were numerous and noisy. One hot, still day the birds were all quiet. I inquired of my guide, "Where are the birds to-day?" He shook his head and said, "Big storm come." Next night the storm came; a deluge, with heavy and continuous thunder and lightning; killed two Cingalese and the horse they drove, a few feet from me.
>
> In March, 1886, I was on Mauna Kilauea, the volcano, and I noticed the birds did not sing. On the night of the 4–5th there were forty-three earthquake shocks felt, the bed of the crater broke down, etc.
>
> In June, 1893, I was over the same mountain, and the birds were numerous, happy, and noisy, and no unusual storms occurred, nor were there eruptions of the volcano.
>
> I might name other instances, but I might weary. I am sure, however, that in some things our wild birds know more than we.

From the many replies received to my letter of inquiry the following extracts may be interesting.

Prof. F. U. White, voluntary observer, Galva, Henry County, says:

> I have often noted that birds became silent upon the near approach of a storm, or gave desultory notes and went into hiding, especially before our afternoon thunderstorms when the sky became suddenly overcast and dark, with premonitory gusts, and even in the calm preceding these. I have never known nor before heard of animals being affected so far in advance of a storm as Mr. Warner gives in his note.

Mr. T. W. Stoner, crop reporter, Henry, Marshall County, says:

> I have been a close observer of the birds. Yes, they seek a safe place and keep perfectly quiet just before a storm, but I don't think they do as long a time before as Mr. Warner says. The brown thrush, robin, quail, and meadow lark will perch on some object off the ground, as the fence or tree, and sing for a long time occasionally before a rain. In fact many consider them something of a barometer. It appears that they have an instinct or knowledge of an approaching storm, and after it is over their songs and rejoicings are delightful. I am a warm friend of the birds.

Mr. C. N. Butt, voluntary observer, Knoxville, Knox County, says:

> I did not notice any change in the song of the birds at the time you speak of, but I have frequently noticed swallows and other birds, especially whip-poor-wills, in the afternoon when cloudy or threatening weather came before a rain, flying high in the air. I supposed they were catching gnats or flies for food.

Dr. Frederick A. Powell, voluntary observer, Henry, Marshall County, says:

> Many people to whom I have spoken about your letter of inquiry tell me that they often notice a restless movement among birds before a severe storm.

Mr. W. I. Greeley, voluntary observer, Tiskilwa, Bureau County, says:

> I did not notice any difference on the 15th, but have always considered it a sign of rain when robins sang on tops of trees. I have made inquiries; one farmer said he was going to thrash on the 16th, but he thought it looked very much like rain on the night of the 15th. He had pea fowls which always made a good deal of noise before a rain and they were quiet, he noticed it and thought it peculiar.

Mr. Wm. Marriott, crop reporter, LaMoille, Bureau County, says:

> I will here mention one or two things we noticed and my family spoke of. One was the screeching of the pea fowls; they kept up quite a racket on the day and evening before the storm. My wife spoke of it to me.

Mr. John A. Ettinger, crop reporter, Adeline, Ogle County, says:

> Robins, while in their season here, give warning of rainstorms by their unusually loud and persistent singing.

Mr. E. Stevens, crop reporter, Lena, Stephenson County, says:

I am not an ornithologist, only a farmer, but the habits of birds, insects, and animals have ever been a matter of interest to me. I have often watched them before a storm. While I can not recollect noticing the entire silence of birds for so long a time before a coming storm, they certainly do seem possessed of instinctive knowledge of coming storms. My observation leads me to say that parent birds are very active, and therefore too busy to sing, in providing food for their young often hours in advance of a storm. Nesting birds seem to hurry their work and make every possible preparation for the coming storm. You will scarcely ever see a wild bird on the wing after the storm breaks. While they do not sing, they frequently utter calls to their mates and "give orders." Some birds fly away out of the range of the storm.

Mr. W. C. Vandercook, crop reporter, Cherry Valley, Winnebago County, says:

When I was a boy an old hunter and trapper boarded in our family one winter. He often told how bluejays would yell and act excitedly before a hard blow, and often called our attention to the fact that there would be a hard wind within twenty-four hours, which invariably came to pass. It became so impressed on my mind that I often notice it and say to my family that there will be a hard wind because the jays are screaming. This is noticeable during the winter and spring more especially for the jay is a very quiet bird during the summer, hardly ever making a noise unless in defense of its young.

Mr. R. Williams, voluntary observer, Streator, Lasalle County, says:

I lived on a farm for twenty-five years, and during that period I can not recall an instance of so long an interval of silence before any visible sign of an approaching storm. Birds during the nesting season seem to sing more, just before a rain.

Mr. Charles A. Love, voluntary observer, Aurora, Kane County, says:

My father used to speak of the birds singing in an unusual manner in the mornings just before an ordinary rainstorm. Of course the air carries sound better during the quiet, early daylight just before a rain, for the air is saturated then; but I never heard of the birds not singing before an approaching storm. In the light of experiences which have been recorded in the WEATHER REVIEW, of the burning of kite wires in a clear sky by electricity, I can partially realize how the birds which fly high can discern the approach of a storm and seek refuge accordingly. The sensorium of the sweet singers at the surface may be so delicate that the approach of a welcome rain may be heralded forth by chirps and song, and before the awful scourge of hail and lightning stroke be warned away.

An investigation of our text books on meteorology fails to disclose any special comment on the subject of the effect of approaching storms upon birds. Admiral Fitz Roy says in his Weather Book:

Many animals and birds, most insects—even fishes—are acutely sensitive of changes in the air, which can only be accounted for readily by considerations of temperature, moisture, perhaps tension, and varying degrees of electricity.

A statement which is about as much on the subject as any of the writers give, most of them overlook it entirely.

A number of weather proverbs have been found which speak of the effect of approaching storms upon birds, but there are few in regard to our song birds, most of them being in regard to the flight or action of seagoing birds. I find a few, however, which seem to verify the observations of Mr. Warner, among these are the following:

When birds cease to sing, rain and thunder will probably occur.

If birds in general pick their feathers, wash themselves, and fly to their nests, expect rain.

It is said that parrots and canaries dress their feathers and are wakeful the evening before a storm.

If the peacock cries when he goes to roost, and, indeed, much at any time, it is a sign of rain.

Long and loud singing of robins in the morning denotes rain.

Robins will perch on the topmost branches of trees and whistle when a storm is approaching.

The restlessness of our domestic animals and barn yard fowls before an approaching storm is well known and many of their peculiarities have been noted, but I think this is the first time that the silence of song birds has been spoken of, and even more that they should be prophets of approaching storms is indeed a novel and interesting thing. That such is the fact, however, Mr. Warner's observations through many years and much travel, seem to verify.

## PROGRESS IN THE EXPLORATION OF THE AIR WITH KITES AT THE BLUE HILL OBSERVATORY, MASSACHUSETTS.

By A. LAWRENCE ROTCH, Director.

(Read before Section B. A. A. A. S., Boston Meeting, August, 1898.)

Besides various brief accounts of the work at Blue Hill, a detailed description by Mr. Fergusson of the apparatus employed, with a discussion by Mr. Clayton of the meteorological results, until February, 1897, has been published this year as an Appendix to the Blue Hill observations for 1896, in Annals of the Astronomical Observatory of Harvard College, Vol. XLII, Part I.

Many improvements have been made in the apparatus, with the assistance of a grant from the Hodgkins fund of the Smithsonian Institution to obtain meteorological records at heights exceeding 10,000 feet. The single surface Eddy kite has been abandoned and the rectangular cellular form of Hargrave has been perfected by making it larger, more rigid, and relatively lighter, while by concaving the surfaces exposed to the wind the lifting power of the kite is increased. A recent kite of this type has a lifting surface of 90 square feet and weighs 11 pounds.[1] Mr. Lamson's folding aerocurve kite has superposed curved surfaces in front and superposed plane surfaces in the rear, each pair presenting a dihedral angle to the wind. This kite has attained the greatest height. In general, it may be said that our kites, with a short line, rise from 50° to 60° above the horizon and exert a traction of 1 pound per square foot of lifting surface in a wind blowing 20 miles an hour. Elastic bridles diminish the angle of incidence as the wind pressure increases, thereby enabling the kites to fly in gales.

The meteorographs made by M. Richard, in Paris, record three elements and weigh about 2.75 pounds, but one recently constructed by Mr. Fergusson, of the observatory staff, records barometric pressure, air temperature, relative humidity, and wind velocity, and yet weighs only 3 pounds with the aluminum case which protects the recording part from the weather. Much attention has been given to the exposure of the thermometer, and it is believed that the true temperature of the free air is now obtained whenever the meteorograph remains at nearly the same height during a few minutes.

The drum of the first steam windlass was crushed by the accumulated pressure of the coils of wire. A new steam windlass, with a strain pulley, constructed by Mr. Fergusson in 1897, on the principle of Sir William Thompson's deep-sea sounding apparatus has proved entirely successful. It has devices for measuring the length of wire uncoiled and continually recording its traction, and during the reeling in for automatically distributing it on the storage drum.

Since the use of wire in 1896, and with more efficient kites, the heights attained have been greatly increased. Thus the extreme heights of the meteorograph above the hill in all the flights prior to 1896 averaged about 1,000 feet, whereas its height during all the flights of the past three months was about 7,000 feet, and during the month of August, 1898, 7,800 feet. On five occasions the height of 10,000 feet has been exceeded, and on October 15, 1897, records were brought down from an altitude of 11,086 feet above the hill, which were printed in facsimile in the MONTHLY WEATHER REVIEW for September, 1897. The maximum height thus far attained was on August 26, 1898, when five kites, having a combined

[1] The standard size adopted for all Weather Bureau kite stations gives about 70 square feet of surface and weighs about 8 pounds. The Marvin meteorograph weighs about 2.1 pounds and records continuously wind velocity, barometric pressure, air temperature, and relative humidity. The apparatus was designed specially for daily ascensions up to 5,000 feet, at a regular time of day at numerous stations. Frequently 8,000 feet is attained, but higher flights are not sought for at present. The superiority of one large kite over a tandem of several small ones was early shown by Professor Marvin.—ED.

lifting surface of about 200 square feet, lifted 29,000 feet of wire weighing 75 pounds, and the meteorograph recording barometric pressure, air temperature and relative humidity, and wind velocity to the height of 11,444 feet above the hill. A maximum wind velocity of 40 miles an hour was encountered at a height of 11,000 feet, the surface wind being 22 miles an hour. The temperature at the highest point reached was 38° and the air was very dry, while at the ground at the same time the temperature of the air was 75° and its relative humidity 60 per cent. In September, 1897, the meteorograph was twice maintained at the nearly uniform height of 1,700 feet during the greater portion of twenty-four hours and flights were made on seven consecutive days. A discussion, by Mr. Clayton, of these records has been published as Bulletin No. 2 of the observatory under the title: Examples of the Diurnal and Cyclonic Changes of Temperature and Relative Humidity at Different Heights in the Free Air. In July, 1898, a practically continuous record at a greater altitude was obtained during a day and a night. Kites are frequently employed at Blue Hill to measure the heights of the lower surfaces of certain low and uniform clouds which could not be measured by either photographic or visual theodolites. By the traces of the barometer and hygrometer the thickness of clouds may be determined.

In conclusion, it may be affirmed that the Blue Hill experiments have demonstrated the possibilities of kites for the meteorological study of the free air up to a height of at least 2 miles above the earth.[1] The reasons for the superiority of kites over balloons, whenever there is wind, are stated by me in the Strassburg Aeronautische Mittheilungen for April, 1898. At the meeting of the International Aeronautical Committee in Strassburg last April I had the honor to present a report on the subject. The conference recommended that all the central observatories employ this method of investigation as being of prime importance for meteorology. (See MONTHLY WEATHER REVIEW, April, 1898.) At the present time kites are so employed at stations of the United States Weather Bureau, at St. Petersburg, and near Paris. Experiments with kites to obtain meteorological data are also being made in Scotland, the birth place of scientific kite flying, and a similar use of kites is proposed at some of the mountain meteorological stations on the continent of Europe, at the Deutsche Seewarte in Hamburg, and at the Prussian Meteorogical Institute in Berlin.

## PROF. PARK MORRILL.

By Prof. E. B. GARRIOTT.

Park Morrill, Professor of Meteorology, United States Weather Bureau, died August 7, 1898, of typhoid fever, after an illness of three weeks.

Professor Morrill was born in Malden, Ill., in 1860; was graduated from Amherst College in 1881, and enlisted in the United States Signal Corps January 6, 1882. He was assigned to the Baltimore station of the Signal Service, August 8, 1882, for the purpose of pursuing a course of study at Johns Hopkins University for "the acquirement of an experimental and theoretical knowledge of those branches of physics that relate to meteorology, especially heat and electricity."

During the period of his assignment at Baltimore he was promoted to the rank of sergeant, to date July 12, 1885, and his detail at that place was terminated September 5, 1887. While serving as assistant at Boston, Mass., Mr. Morrill was ordered to assume charge of the Signal Service exhibit at the Paris Exposition, and in the performance of this duty he remained in Paris from March 25 to December 2, 1889. At the close of the exposition he returned to the Boston station. On July 1, 1891, he was appointed an observer in the Weather Bureau, and on October 2, 1891, was made local forecast official and placed in charge of the station at Atlanta, Ga., where he remained until September, 1894, when he was transferred to the Central Office, at Washington, for duty as forecast official, to which position he was appointed September 15, 1894. On July 16, 1898, he was made a professor of meteorology in the Weather Bureau and assigned to the charge of the establisment of the West Indian Weather Service.

Possessed of rare mental attainments which were developed by a college training, and ripened by five years of special study and investigation, Professor Morrill was eminently well equipped for a most useful and even brilliant career in his chosen field of work.

His ability and zeal in prosecuting work of a congenial nature was exemplified in the last year of his life. His work, Floods of the Mississippi, will long be considered a standard book of reference, and he will, for all time, be recognized as one of the first active workers in the organization of the West Indian Weather Service, a service which promises to prove of incalculable value to the maritime interests of the United States, the West Indies, and Central America.

Of a disposition generous and genial, he was beloved by those who knew him best. In his death the Weather Bureau loses one of its most gifted members, and the science of meteorology one of its most promising disciples.

## THE PUBLISHED WORKS OF PROFESSOR MORRILL.

By the EDITOR.

In 1881 Gen. W. B. Hazen introduced new life into the service by securing the enlistment of young men of collegiate and scientific training. Mr. Morrill was among these and immediately after completing the course of instruction in signaling and meteorology at Fort Myer, Va., he was assigned to duty at the Johns Hopkins University for the purpose of maintaining a series of observations in atmospheric electricity under the special guidance of Prof. H. A. Rowland. The importance of this subject had been urged from a hygienic point of view by the American Climatological Association. A full account of his electrical work is given by Prof. T. C. Mendenhall, in his memoir of 1889, entitled A Report of Studies of Atmospheric Electricity, published in Volume V of the Memoirs of the National Academy of Sciences, Washington, 1891. Mr. Morrill's work at Baltimore included the establishment of a Mascart self-registering apparatus for atmospheric electricity, and he was the first to maintain such continuous record in this country; its importance was such that the complete record is published in the memoir by Mendenhall, pages 173–207. In 1878 Mr. Morrill was assigned to the station at Boston, and in that connection reestablished the Mascart apparatus at the Massachusetts Institute of Technology, where the record was maintained during the greater part of a year, until his departure for Paris. Mr. Morrill's work at Baltimore is highly spoken of in Professor Mendenhall's report. He, himself, published in Signal Service Note, No. 17, A first Report upon Observations upon Atmospheric Electricity at Baltimore. He also invented a mechanical collector to replace the Thompson water dropping collector, ordinarily used in connection with the Mascart apparatus, and which is fully described on pages 126 and 127 of Mendenhall's report. He

[1] The readers of the MONTHLY WEATHER REVIEW will scarcely need to be reminded that the works of A. Wilson, Ronalds and Birt, D. Archibald, William Eddy, A. McAdie, L. Hargrave, and others demonstrated the possibilities of kites for use in the study of meteorology of the free air at great heights some time before this work was taken up at Blue Hill. The employment of kites at the United States Weather Bureau stations was quite independent of the brilliant work done at Blue Hill or the recommendations of the International Committee. The advantages of kites over balloons are clearly stated by Prof. Willis L. Moore, Chief of the Weather Bureau, in Symons' Monthly Magazine for December, 1896, page 166.—ED.

also devised a flame collector for use in cold weather, as described on pages 128 and 129 of the same report.

In 1889 Mr. Morrill was delegated to represent the Signal Service at the Exposition Universelle at Paris, and his report on this subject, as published on pages 683–686 of the Annual Report of the Chief Signal Officer for 1890, shows his familiarity with physical apparatus.

In connection with his duties as Forecast Official, the question of the reduction of barometric measurements to sea level, for the purpose of drawing daily isobars, attracted his attention; the problem of a reduction appropriate to both mountains, and plateaus, and lowlands has always been a troublesome one, and yet vitally important for the United States. Mr. Morrill's review of the whole subject was thorough and excellent, and his resulting system or method seems to be a decided advance over any previously devised. He applied it also to annual charts as published in the MONTHLY WEATHER REVIEW for 1895, 1896, 1897, and it is now being applied also to the monthly isobars on Chart IV of the current REVIEW. He also constructed the isobars for higher levels, as published in the annual summaries for these years.

The current work on the prediction of floods in rivers was assigned to Mr. Morrill after the retirement of Prof. Thomas Russell, and this gave occasion for his monthly publication of summaries in the MONTHLY WEATHER REVIEW, as also the preparation of several annual volumes of daily rainfall and heights of rivers. His last work on the floods of the Mississippi is as creditable to him as it is to the Service.

## DESTRUCTION BY LIGHTNING IN THE STATE OF NEW YORK DURING THE MONTH OF AUGUST, 1898.

BY ROBERT G. ALLEN, Section Director.

The month of August was remarkable for the almost daily occurrence of thunderstorms and for the violence and frequency of destructive lightning. The oldest citizens, who reported during July unprecedented losses by lightning, now report that the damage of this description during the month of August was far in excess of that reported in July, and that the storms on the 16th, 23d, and 24th were the most severe ever witnessed in this State.

The storms of the 23d were most violent in southeastern New York and in the upper Hudson Valley. The storms of the 24th were most severe through the eastern highlands and in the counties bordering on Lake Ontario.

Fourteen persons are reported to have been killed during the month; these reports are incomplete, and it is most probable that those instances reported are less than 50 per cent of the number of persons killed. Thunderstorms occurred on every day in the month, excepting the 11th and 20th, and destructive lightning occurred on the 1st, 2d, 3d, 4th, 5th, 7th, 8th, 9th, 12th, 14th, 15th, 16th, 17th, 18th, 22d, 24th, 25th, 26th, 29th, and 30th.

The storms of the 16th and 23d were more extensive and far more violent than those on any of the other dates mentioned, as will be seen by reference to the losses on the different dates given below.

It is probable that the losses reported herein are much less than the actual amount of such damages, as it has been almost impossible to obtain the information from all the localities visited by the severe electrical storms. It may be interesting to know that not one of the burned or injured buildings was provided with lightning rods, and that about 50 per cent of the buildings struck by lightning were located on dry upland. A majority of the barns burned contained the season's crops.

The difference between the number of barns burned (96) and the valuation of the property destroyed ($120,524) and the number of dwellings burned or injured (29) and the amount of damage ($3,276) is worthy of notice.

The following is a record of barns and houses burned or injured and the value of live stock killed during the month of August:

August 1.—One dwelling slightly injured.
August 2.—One residence, damage $18.
August 3.—Eight barns. $5,405; 1 dwelling, $1,900; stock killed, $260.
August 4.—Three barns, $4,650; 1 dwelling, $80; stock killed, $95.
August 5.—One barn, $600.
August 7.—One barn, $450.
August 8.—One church, $30.
August 9.—Stock, $35.
August 12.—Two dwellings, $313.
August 14.—One dwelling, $89.
August 15.—One barn, $1,000.
August 16.—Twenty-two barns, $21,160; 2 residences, $21; stock, $150.
August 17.—Thirteen barns, $18,520.
August 18.—One dwelling, $8.
August 22.—One barn, $850.
August 23.—Twenty-three barns, $42,908; 14 dwellings, $531; stock, $939.
August 24.—Sixteen barns, $16,976; 5 residences, $215; stock, $455.
August 25.—Stock, $17.
August 26.—One barn, $900.
August 29.—Five barns, $6,499; 1 residence, $100; electric car injured, $150, and 1 wheat straw stack burned, $40.
August 30.—One barn, $1,200.

Total number of barns burned or injured, 96; amount of damage, $120,524. Total number of dwellings burned or injured, 29; amount of damages, $3,276. Total value of stock killed by lightning, $2,060. One church struck and damaged to the extent of $30. One electric street car injured to the extent of $150. One wheat straw stack burned, value, $40. Total amount of all damages reported during the month of August, 1898, $126,081.

[The above list is accompanied by a map of the State of New York showing every locality where lightning struck during August. Not having the necessary blank maps for New York the Editor can not publish Mr. Allen's map in detail, but several features may be mentioned.

1. In general no records of lightning strokes can be expected from regions that are sparsely inhabited, therefore none are reported from the Adirondack region, and in fact but six from the whole northeastern third of the State of New York.

2. A belt of special frequency extends from Niagara Falls directly eastward to Albany. This evidently marks the rich farming track traversed by the New York Central Railroad and the canal. An area of special frequency occurs in the southeastern portion of the State, principally in Orange, Ulster, and Duchess counties.

3. In general the distribution of strokes over two-thirds of the State is so uniform as to lead one to believe that the same distribution would prevail over the northern third, if there were enough observers there present to take cognizance of them.

4. In general it is not the number of voluntary observing stations that controls the completeness of our records of lightning strokes, but the number of farmers with their dwellings and barns, and the activity of the local press reporters.

5. The special frequency of strokes in any small portion

of the State is due not to the general frequency of thunderstorms in that region, but to the occurrence of some one specially severe storm.

6. Mr. Allen gives no data by which one can estimate the relative safety of buildings with and without lightning rods, as every one of those injured had no lightning rod. Some years ago several of our American firms manufacturing lightning rods, in their replies to the circulars of the Lightning Rod Conference, stated that no buildings protected by their rods had ever been injured. Doubtless this was an exaggeration, and yet the general conclusion to which that conference arrived still holds good, i. e., that injuries are inflicted only when the lightning rod is imperfect. If it be properly made and placed in the proper position, and in perfect electrical connection with the earth, and be terminated at the top with fine points, then the edifice protected by it with all that it contains will be safe. All accidents may be said to be due to a neglect of these simple elementary principles; "there is no authentic case on record where a properly constructed conductor failed to do its duty."—ED.]

## NOTES BY THE EDITOR.

### BALL LIGHTNING.

The Editor has received the two letters following from Mr. C. N. Crotsenburg, Crow Agency, Montana, dated August 22 and September 6, 1898, respectively, and submits his own suggested explanation, but thinks it worth while to publish the whole in full, in order that the attention of others may be drawn to the subject, since, if his own explanation is correct, the phenomenon must be frequently seen by others:

As you expressed a desire to hear from those who had observed "ball lightning" at various times, I will relate an experience which befell me in the summer of 1896. I was then employed as a railway postal clerk on the line of the Chicago, Rock Island and Pacific Railway, between Davenport, Iowa, and Leavenworth, Kans.

One very dark night, about the middle of the summer, our train was going northward between Trenton, Mo., and Lineville, Iowa. Just before reaching Princeton, in Mercer County, a heavy rain began falling, which necessitated the closing of the doors on the east side of the mail car. Soon after leaving that station, at 10:35 p. m., my companion (Mr. R. C. Corbin) lay down for a short sleep. The work being very light that night, I sat in a chair, looking out of the car door to the west. The darkness was intense; not a ray of light was visible from any point, except from the train. When a few miles out from Princeton, and while traveling almost due north, I observed a peculiar light low down on the western horizon. It appeared to be perfectly round and about a foot in diameter, of a dull rose color, or, possibly, like a piece of live coal. When first observed it seemed to be floating within a hundred feet of the earth, but soon rose to a height about midway between the horizon and the zenith. For a time it floated very steadily, but soon began to oscillate up and down, at times even dropping out of sight behind hills. The wind was quite strong from the east, but the light traveled in an almost true north course. Its speed varied, sometimes seeming to outrun the train considerably, and at others it would fall behind, but never far enough to be lost to sight. Most of the time it appeared to be nearly abreast of the train and apparently from half a mile to a mile distant. Soon after it was first observed by me, my companion arose, and we both watched it closely until the town of Lineville, Iowa, was reached. There it passed out of sight behind the depot, and we saw it no more. During all the time it was in sight there was a heavy fall of rain, but very little lightning. It seemed to follow a course parallel to the Grand River, moving upstream. We had no idea at the time what caused the light, but I have since become convinced that it was "ball lightning."

* * * * * * *

Replying to your letter of August 30, and referring to my own of August 22: I have no means of ascertaining the date of the occurrence related. It made a very deep impression upon me at the time, and Mr. Corbin and myself often talked about it afterward, but I made no note of the date. We made many inquiries concerning the phenomenon which we observed, but never obtained a satisfactory explanation. We thought of distant electric light, but found that none existed within the range of our vision on that portion of the road. Since beginning this I remember that we remarked that if it had occurred a few nights before we should have felt certain that it was the light from a balloon sent up from some Fourth of July celebration, so probably it was within a week of July 4, 1896.

But even then, it would have been remarkable, as the light traveled almost directly north and kept an even course, while the wind blew quite strongly from the east. It was so very strange that I should never have mentioned it, even to my friends, had it not been corroborated by a reliable witness. I have sought for an explanation whenever and wherever I have had an opportunity, and from what I have been able to learn I had come to the conclusion that it was most probably "ball lightning."

Although my conclusions may be entirely erroneous, I have no more plausible theory to advance.

The fact that it was observed by both of us at the same time, and had the same appearance to his eyes as it had to mine before he saw it is very good evidence that it was a reality and not an hallucination. He observed it as he was passing the open door, and before I had spoken to him. In fact the thing was so unreal that I hesitated to speak of it, fearing that it was some freak of my imagination, but when he too saw it the same, I could no longer doubt its existence as a reality, and we both observed it closely while the train was running at least 15 miles. When it disappeared it was at least a mile from us, as the buildings of the town were plainly visible and it was some distance farther west than any of them.

There has always been a great deal of doubt as to whether the phenomenon known as "ball lightning" might not in some way be an optical delusion. The phenomenon rarely occurs, and it is therefore rarely seen by experienced electricians, and the latter were therefore justly skeptical. But within the past twenty years, so many instances have been recorded, some of them by observers of undoubted ability, that there can be no doubt but what this form of electrical discharge can exist, although at present we have no idea of its relation to the other forms of electricity. The following instances are recorded in the famous report of the lightning rod conference, compiled by ten or twelve members of prominent scientific organizations in England, edited by the well-known meteorologist G. J. Symons, and published in 1882:

Page 99. Near Strasburg, Germany, a discharge of globular lightning traversed a horizontal distance of 919 yards, passing below the top of a building which had three good conductors upon it, and struck a distant chestnut tree.

Page 205. D. Morgan, Master of the bark Southern Queen, on December 30, 1879, in the midst of a terrific squall, saw a ball of fire descend from the mizen and go over the port side of the vessel.

Page 242. Prof. P. G. Tait, of Edinborough, says that fire ball or globe lightning undoubtedly exists, and is probably due to a species of natural leyden jar very highly charged, which no lightning rod can destroy, except perhaps a close net work of stout copper wires.

The preceding account of a phenomenon by Messrs. Crotsenburg and Corbin does not harmonize with the ordinary descriptions of ball lightning well enough to justify applying that term to it, and the editor believes that some other explanation of the phenomenon must be found. If there were a mass of falling rain, or fog, or haze at a little distance west of the train in which they were traveling, or in fact if there were groves or forests, the leaves of which were covered with rain drops, these would undoubtedly send back to the observer's eye a faint reflection or more properly an antisolar corona, which would be barely visible on a dark night. It would necessarily appear to float along with the train, as the Crotsenburg phenomenon did. There can be no doubt but what the light observed in this case was some form of reflection of the light of the train itself, as it certainly had none of the characteristics of ball lightning.

### THE MEASUREMENT OF THE WIND.

The velocity of the wind is usually measured by means of some form of windmill apparatus, such as the Robinson ane-

mometer or the rotating blades of Combes' wind meter or the curved plates of the Richard anemometer, or of Dine's helicoid anemometer. On the other hand the wind pressure is observed by exposing a plane plate, normal to the direction of the wind, or sometimes a sphere is substituted for the plate; in Wild's pendulum anemometer the plane plate swings like a pendulum out of the vertical position for calms, up to as high an angle as the force of the wind requires. This latter form of apparatus gives us some idea of the force of the gust of wind, the gust may be but momentary, being only the front of a "pulse of pressure," or of a revolving eddy; its force is due to the very rapid motion, through a very short distance, of a small mass of air. When such a gust strikes the cups of the Robinson anemometer they are whirled about with great speed, and retain that speed for some time after the gust has ceased. The sum total of the movement shown by this anemometer is distributed over a longer time than the gust itself endures, and the extreme velocity attained is less than that of the gust at its maximum intensity, but the average velocity shown by the cups is greater than belongs to the gust as a whole. If, therefore, we compare the records of the maximum pressure and the maximum velocity recorded in the open air we find that the velocity seems to be less than is appropriate to the pressures.

If, on the other hand, the velocity and the pressure anemometers are set up side by side in a current of perfectly uniform wind, or failing that, if they are established on a uniformly revolving whirling arm in a room with still air, then, for this case of uniform motion, the pressures and the velocities harmonize perfectly. This latter is the ordinary method of comparing anemometers in order to deduce figures necessary to reduce the indications of one instrument to that of another. Nearly all kinds of anemometers will agree very closely when they are compared in a perfectly uniform stream of air, but they will show wide differences in gusty winds. These differences will increase in proportion to the friction within the apparatus, and especially in proportion to the inertia, or more properly the moment of inertia.

This gusty nature of the atmosphere has of course been known from ancient times. In fact the motion of the air in what we call a steady wind is not linear but a mass of whirls and eddies, as may be seen by any one who will watch the gyrations of a snowflake. Professor Marvin seems to have been the first to perceive that the presence of these gusts explains the discrepancy between the action of the anemometers in the open air as compared with their behavior in the steady wind of the whirling machine. He has explained this matter and given accurate determinations of its amount in numerous publications between February, 1889, and December, 1890. In order to show the effect of gustiness most clearly Professor Marvin employed some very light anemometers of paper of the same size as the regulation Robinson anemometer, having previously used others of much smaller size. The sluggishness of these anemometers depends upon the moment of inertia, viz, the mass multiplied by the radius of gyration, and his smallest anemometers had not one one-thousandth part of the sluggishness of the regulation apparatus. The latter being set into rapid motion by the gusts showed slightly larger average velocities than the smaller instruments which showed higher maximum velocities, but stopped their rapid motion as soon as the gusts went by.

Professor Marvin concludes that after determining the error of an anemometer in a steady wind by means of a whirling apparatus, one must then still further determine its errors in gusty winds; but this latter is well nigh impossible, or rather useless, because the gusts are of such infinite variety, as to severity and lengths and vacillation. It would seem possible to establish side by side in the open air several anemometers of very diverse moments of inertia, in order, by the comparison of their records, to determine the general influence of the gustiness of any particular location or wind. In general, Professor Marvin finds for the average character of the gusts at Washington a set of corrections that are embodied in his pamphlet on anemometry. His last report on this subject, dated October 4, 1890, is published on pages 691–698 of the Annual Report of the Chief Signal Officer of 1890, and as his results are frequently called for, we quote from that report the following:

The formulæ derived for the Signal Service anemometer having cups 4 inches in diameter on arms 6.72 inches long are—

(*a*) $V = 0.225 + 3.143\, v\, 0.0362\, v^2$—(for whirling machine.)

(*b*) $V = 0.263 + 2.953\, v\, 0.0407\, v^2$—(*a*, reduced to open air.)

$V$ is velocity of winds in miles per hour; $v$ is velocity of centers of cups in miles per hour.

Equation (*b*) may be considered as the equation of the regulation Signal Service anemometer when exposed to the variable wind of the open in Washington, while equation (*a*) is for the same anemometer exposed to perfectly steady winds.

[and a moment of inertia of about 117,000 grammes centimeters.]

In order to overcome certain defects in this quadratic equation which would prevent its being applied to very high velocities, Professor Marvin deduced and recommends the following logarithmic form:

(*c*) $\log V = 0.509 + 0.9012 \log v$

With this formula he computed a table of wind velocities as indicated by Robinson anemometers, converted into true velocities especially applicable to the gusty winds of Washington, from which we make the following abstract:

| Weather Bureau anemometers. Indicated velocity. | True velocity. |
|---|---|
| *Miles per hour.* | *Miles per hour.* |
| 10 | 9.6 |
| 20 | 17.8 |
| 30 | 25.7 |
| 40 | 33.3 |
| 50 | 40.8 |
| 60 | 48.0 |
| 70 | 55.2 |
| 80 | 62.2 |
| 90 | 69.2 |

The importance of inertia in gusty air is also dwelt on by Professor Langley in his memoir On the Internal Work of the Wind, published in 1893, in the prosecution of which he was assisted by Mr. G. E. Curtis, formerly of the Signal Office, and made use of the paper anemometers constructed by Professor Marvin.

The last volume of the Archives of the German Marine Observatory at Hamburg, contains an elaborate memoir by Dr. George Neumayer, on anemometer studies, in which he reviews the whole subject, and concedes the correctness of Professor Marvin's results, which have also been further confirmed by the investigation of Dr. C. Chree, Director of the Kew Observatory.

## NOTES FROM THE AUGUST REPORTS OF THE CLIMATE AND CROP SECTIONS.

### ALABAMA.

The regular meteoric shower of August will frequently bring large meteors, and this seems to be especially the case in Alabama, where especially brilliant meteors were observed on the 9th at 8:40 p. m., at Selma, and on the 16th at 9.30 p. m., at Montgomery. The latter was so brilliant as to outshine the public electric lights.

### ARIZONA.

The voluntary observer at Fort Mojave reports that on the 28th there was a heavy rain and furious wind, but the latter

upset his rain gauge; other measurements gave rainfall of about 8 inches in forty-five minutes. May not the Editor make this unfortunate upset of the rain gauge the text for an urgent appeal to all observers to reexamine and strengthen the defenses of the gauges. Here was a rare phenomenon lost to accurate measurement by over confidence in the firmness of the gauge, and it was merely good luck that the observer happened to have a wash tub set out on the mesa, clear of everything, which caught 8 inches of rain. Is it not remarkable that the rain gauge, although firmly secured was upset, while the wash tub, without being secured, was undisturbed ?

FLORIDA.

The Section Director, Mr. A. J. Mitchell, has been fortunate in securing from Judge Richard some account of the freeze of 1833. The Judge says that it was not very severe, the ground being frozen about one-half inch on freshly plowed land. The correct date of the freeze was the 27th of April, and not February or March as sometimes erroneously stated.

GEORGIA.

Mr. Marbury, Section Director, reports a remarkable meteor observed at Atlanta at 10:15 p. m. of the 30th. As this meteor was not reported from any other station we must infer that cloudy weather hid it from most of the observers. Yet, on the other hand, as its course, as seen at Atlanta, was within 45° of the zenith, and as its height when it disappeared might not have exceeded 10 miles, it may well be seen that very few observers, except those close to Atlanta, could have had any chance to see it. A meteor like this might fall simultaneously into every circle of 10 miles radius throughout the world, and yet each would only be observed by two or three observers within the respective circles.

LOUISIANA.

The relation of the climate and crops is a matter of great complexity and ordinary statistics of the climate and crops do not generally show clearly any specific relation between them, but in an article in the Louisiana report Mr. Alexander McAdie quotes from the Louisiana Planter an item of great importance, viz :

In 1890 the rains on the sugar plantations of Louisiana *fell so nearly when and where they were wanted* that the sugar crop of 1889 of 144,000 tons was followed by a crop in 1890 of 252,000 tons. The distribution of rainfall was ideal. Every sugar planter seemed to have just the rains he wanted and the results showed up in an immense crop; black clay lands that ordinarily do well to yield 20 tons of plant cane, having given that year 35 tons. It is apparent therefore that not only the amount of rain falling in any year but also the distribution during the growing and maturing seasons are important factors in determining the crop yield.

We shall look with interest for the discussion upon this subject from Mr. McAdie, promised by him. In fact we are not sure but that it is about time to publish portions of a memoir on the relations between the climate and crops that was prepared by the editor in 1891 for the use of the Weather Bureau.

NEW MEXICO.

The successful cultivation of most crops depends upon the soil and the water quite as much as it does upon the meteorological climate. In New Mexico, where there is a superfluity of sunshine and heat, there is not sufficient rainfall at the proper time of the year, and the report in this section for August calls attention to the great advantage of the absolute control over the water supply that is afforded by artificial irrigation.

The large amount of sunshine and small amount of rainfall make it possible to harvest crops of hay and small grain with much more certainty than is possible in regions where the rainfall is more abundant and the sky is overcast with clouds a greater portion of the time.

On account of the abundant sunshine and dryness of the air and the absence of extreme sudden changes New Mexico offers conditions favorable to the relief of those suffering from diseases of the lungs.

It is a climate suited to the case before the destructive stage has arrived. * * * Our observations are such that we would recommend the Pecos Valley of New Mexico to those persons who have not yet reached the stage of disintegration.

PENNSYLVANIA.

During the summer season our notes from the section reports inevitably include a large number of severe local storms, but especial interest will attach to one that passed over Philadelphia on August 3. This seems to have been the severest storm on record for over a century, and it was moreover remarkable for its restricted local character. It lasted between 10:15 a. m. and 12:35 p. m., being nearly stationary over the city. Lightning flashes occurred in rapid succession. A large number of buildings, towers, flagstaffs, etc., were struck by lightning, "but probably owing to the heavy downpour of rain no serious fires occurred with a single exception of the destruction of the oil tanks at Point Breeze." Incipient fires may have been extinguished by the downpour of rain, as Section Director T. F. Townsend suggests, or else the lightning may have been conducted harmlessly to the ground through the thin layers of water which covered the roofs, a view known to harmonize with experience. But may we not go even farther and infer that the flashes, coming down with abundant rain in the midst of the storm, are really not so powerful from an electrical point of view as those that strike through the clear air from a thunder cloud at a considerable distance? This storm, in Philadelphia, after passing a short distance north of the station seems to have circled toward the northeast and returned directly over the station before resuming an easterly course. The total rainfall at the Philadelphia Weather Bureau station, 9th and Chestnut streets, during this storm, was 5.43 inches and was practically the same at the Pennsylvania Hospital station and at that of the voluntary observer in Camden, N. J. A station maintained by the Department of Surveys, at the corner of 5th and Wharton streets, reported 5.17 inches in three hours and thirty minutes, while another station maintained by the same department, at the corner of Frankford avenue and Orthodox street reported only 1.75. Occasionally we meet some one who is incredulous as to the necessity of having so many rainfall observers, but instances like this serve to emphasize the importance of the general principle that the Weather Bureau ought to encourage the establishment of just as many rain guages as possible. We need to study not only the extent of local storms, but also the peculiarities of specific locations. Not only does every hillside and valley have its own rainfall, but every storm and cloud has its own limitatations. If ever, in the future, the student of atmospheric electricity succeeds in proving that rain can not fall without some kind of electrical discharge, either by lightning flash or otherwise (that in fact rain drops can not be formed without electrical influences), then, of course, the quantity of rain and the quantity or quality of the electricity will stand in some important relation to each other, so that knowing one we shall be able to infer the other.

The retrogression of this storm, by reason of which it remained so long over the city of Philadelphia, is a matter of much interest in the mechanism of thunderstorms. It is very much to be hoped that the observers in southeastern Pennsylvania may be increased in number and pay increased attention to the location of every thunderstorm that passes within the range of their respective horizons, so that we may be able to draw numerous charts of storm tracks as a preliminary step in the prediction of thunderstorms for that city.

TENNESSEE.

Showers of extremely brilliant meteors were observed at a number of places on the 10th, 11th, 12th, and 13th.

The observer at Greeneville reports a waterspout on the 10th in Green and Hawkins counties. We presume that he means a cloud-burst, namely, a heavy downfall of rain. In the genuine waterspout the water ascends rather than descends.

The observer at Lewisburg records a cloud formation at sunset of the 31st which consisted of branches extending upward from a base, but all intersecting at some point in the horizon. We presume that this is a form of illusion due to perspective. If these branches were really clouds parallel to each other and extending away from the observer, they would by perspective all seem to meet at a point in the horizon (which the draughtsman calls the vanishing point). This is illustrated every day when one observes carefully the rows of houses in a street or the parallel rails of a railroad. But it is barely possible that these branches were not clouds, but were simply the shadows of clouds. After sunset there will often be seen beautiful bars or streaks of light rising up from the western horizon. These are the effect of cloud shadows, or, sometimes, even mountain shadows. The original lines are all perfectly parallel with each other, but, by reason of perspective, they appear to converge, intersecting at the sun. A similar illusion will be noticed even when the sun is high in the heavens and when cumulus clouds shade a part of the hazy, gusty air, while the spaces between the clouds are brightly lighted up by the sun. The latter will then appear as bright beams converging upward toward the sun. Some call them Jacob's Ladder, others say that the sun is drawing the water, but the real phenomenon is simply one of shade and shadow, and perspective.

TEXAS.

The August report contains mean temperatures and pressures for three Mexican stations contributed by the Mexican Telegraph Company. Mr. Cline has done good service to meteorology by stimulating the cooperation of this influential cable company with our West Indian system. He has inspected its stations, and will consider them as part of the Texas section. It looks very much as though one of the three reported pressures at sea level were slightly erroneous. An error of a hundredth is more important in the tropical regions than in the extreme north temperate zone.

UTAH.

Mr. Isaac J. Elkington, the voluntary observer at Tooele, reports that on the 30th, at 4:10 a. m., he saw a perfect, white rainbow. It began to disappear in the southeast, but was visible in the northeast until 4:30 a. m., when it vanished.

The white rainbow is really a halo formed in mist or clouds, whose globules are too small to allow the formation of the regular colored rainbow. The rainbow is due to interference, not to dispersion of light, and requires full-sized raindrops to form it in perfection.

WISCONSIN.

The Section Director, Mr. W. M. Wilson, reports the heaviest rainfall on record for one hour at Milwaukee on Tuesday afternoon, August 23. He says nothing about attendant thunder and lightning, but adds that the storm was very local and that "unlike the local thunder storms noted in the July report the self-registering barometric trace showed no mark of oscillation before or during the progress of the storm. There was a gradual increase of pressure and a noticeable condition of instability, but no marked rise which usually indicates the approach of severe local thunderstorms and wind squalls."

In the early part of the century, and in fact up to 1871, there was probably no one except Prof. William Ferrel who had divested himself of the old fashioned error that when the rain falls the atmosphere must be lighter and therefore the barometer should fall. He, however, as it is now universally recognized made it clear that the fall of the barometer in our general whirling storms was not due to the rainfall but to the whirl, and he applied this same principle to the formation of the central core of a waterspout. On the other hand in thunderstorms and ordinary local rains which descend from small clouds high above us, there is no apparent general whirl, or if it exists it is small and confined to the region of the cloud, so that it does not seem to affect pressures at the earth's surface. In these cases the rain may fall and produce a very different class of phenomenon; whatever the pressures may have been in the cloud region, we at the earth's surface come under the following different conditions: (*a*) The falling rain must have a tendency to drive the air down before it, producing a pressure at the surface of the ground, where the air being checked in its descent, begins to flow out from under the rain. This increase of pressure may sometimes be appreciable, but generally it is small because pressure gives way as soon as the air moves away. (*b*) The falling rain cools the air, and if thereby a thick layer of cool air replaces the former warm air and allows other air to overflow it, the total weight, and therefore the pressure, is increased. (*c*) But more important than either of these is the consideration that the rainfall is usually a result of the ascent of air, which is cooled by the necessary expansion as it rises. Now this air would not rise if it were not pushed upward by an under flowing and uplifting mass of denser air, which is usually denser because it is both drier and colder. Oftentimes the thin layer of denser air does not at first descend to the earth's surface; it generally comes in as a wedge, inserted as it were between the cloud overhead and the air near the ground below. It brings with it a change of temperature and almost always a change in the direction of the wind; it is pushing its way forward like the nose of a plow under ground, and that push means pressure, and the moment its influence is felt at any station up rises the barometer, oftentimes without any rain at all, but more generally with temporary cloudiness and short rains. This is the process that goes on at the clearing up side of any storm; in extended storms the horizontal distribution of low pressures, rain, clouds, clear sky, and high pressure, covers so large a region that we can easily separate one from the other. The same process also goes on in the smallest local storm and in a thunderstorm, where the phenomena are all crowded close together.

Between every thunder cloud there is undoubtedly a mass of descending dry air, equal in volume to the ascending air within the clouds. We, at the earth's surface, are unconscious of the descending movement until the air strikes the ground, just as in the case of a man holding out his hand while a baseball is descending toward it, the hand like the barometer gives no indication of this special weight or inertia of the descending mass until the mass strikes it and is resisted. At first the inertia or vis viva of the moving mass is overcome; this is the blow or impact; then the added weight must be sustained, and then it is that the barometer rises permanently. It is the extra pressure, due to the extra weight of the descending masses of air that makes the barometer rise steadily after our local storms when they occur in the front of an advancing area of high pressure.

WYOMING.

The voluntary observer at Basin, Mr. Jas. I. Pattin, notes a remarkable display of lightning from a dark cloud.

Remarkable display from a dark cloud hanging over Bald Mountain, in the Big Horn, on the evening of August 3, when many varieties of

lightning were noticed, including heat flash, multiple flash, destructive or rushing bolt, as well as the flash from earth upward, all alternating and lasting nearly two hours, when the cloud gradually disappeared. The phenomenon was a beautiful sight.

We must be careful in the matter of describing a flash as proceeding from the earth upward or from the clouds downward. A lightning flash does not last more than a few millionths of a second. In that short interval of time it makes a vivid impression on the retina, and the impression lasts at least one-tenth of a second. If, during that tenth, the eyeball moves even the least bit, it carries this impression with it; an observer may glance up and down several times during that tenth of a second and he will appear to see the lightning flash go up and down between the cloud and the earth. This is purely a subjective phenomenon; it is produced entirely within our own nervous system, and has nothing to do with the lightning, as it takes place after the lightning has entirely passed by.

One may often be alarmed at suddenly noticing that the anemometer has stopped revolving and then starts on again, or that it suddenly begins to turn in the opposite direction and tipped up instead of horizontally. In the presence of a large fly wheel one may glance along with the swiftly moving rim and see it apparently stand still. Such subjects, however, should not be mistaken for anomalies in nature.

## RAINFALL AT COLON, COLOMBIA.

The following record kept by Mr. O. B. Schaffer, of the Panama Railway, has been kindly communicated by Mr. Robert T. Hill, of the United States Geological Survey. No details are given as to the size or location of the gauge, further than that it was at Colon:

*Memorandum of rainfall at Colon, R. C.*

| | 1893. | 1894. | 1895. | | 1893. | 1894. | 1895. |
|---|---|---|---|---|---|---|---|
| | *Inches.* | *Inches.* | *Inches.* | | *Inches.* | *Inches.* | *Inches.* |
| January | 1.73 | 5.35 | 3.85 | August | 15.10 | 23.02 | 14.15 |
| February | 3.86 | 1.69 | 1.89 | September | 9.92 | 18.79 | 12.11 |
| March | 1.81 | 0.36 | 2.08 | October | 12.28 | 12.43 | 16.47 |
| April | 8.05 | 2.18 | 22.36 | November | 17.78 | 23.66 | ..... |
| May | 6.65 | 9.84 | 16.17 | December | 30.94 | 25.12 | ..... |
| June | 12.34 | 12.24 | 9.25 | | | | |
| July | 11.44 | 19.08 | 17.10 | Totals | 131.90 | 153.76 | ..... |

## SENSIBLE TEMPERATURES OR THE CURVE OF COMFORT.

The Editor has been requested to state what methods should be used in order to calculate the sensible temperature when the ordinary wet and dry bulb thermometers have been read. This is a subject upon which, at present, there is no agreement among the authorities and, indeed, he knows of no satisfactory investigation upon the subject that he could recommend others to as a model, although for a hundred years past the subject has frequently been referred to, and it is quite generally conceded that the temperatures shown by a thermometer is a very imperfect index to that sensation of heat experienced by human beings.

Before attempting to express the sensible temperature in degrees, on the Fahrenheit scale, we are forced to realize that no two individuals are likely to agree very closely as to whether a given condition of the atmosphere should be called hot or cold, comfortable or uncomfortable. An extended effort was made in Washington in 1872–5 by Mr. J. W. Osborne to secure a corps of observers who should record several times daily their individual sensations. From these records he anticipated that it would be possible to establish a scale of terms closely corresponding to the scale of thermometric degrees, by means of which all observers would be able to record their sensible temperatures. But different individuals differed so entirely in their sensations on the same day that nothing satisfactory could be made out of a year's records by twenty or thirty observers. It is a matter of every day experience that even one and the same observer is affected differently by the weather under different circumstances, for instance, before and after eating or drinking; when clothed warmly or thinly; before and after a bath; and so on indefinitely. Recently, several complaints have been made in the daily papers to the effect that Weather Bureau predictions of warmer or colder weather were of no use to the workmen in the streets of New York because the Weather Bureau thermometers were high above the ground on tall buldings, and a change of 1° or 2° at those elevations might mean 5° or 10° in the street below. Now, the fact is that an observer, or especially a working man, may suffer from perspiration and, perhaps, sunstroke in the streets, whereas, if he were on top of a high building he would think it delightful tropical weather. The occupation in which a man is engaged is one of the most influential factors in determining his sensations as to temperature.

It must be evident that if we are to attach any definite conception to the idea of sensible temperature, we must ignore all the variations and irregularities introduced by clothing, by sickness, and by occupation or work, that is to say, the one who observes and the critic for whom we make predictions must be in normal health, perfectly quiet and passive, and clothed in the lightest possible manner. But even this is not sufficient. There is almost an infinite variety of normal physiological structures from the fair-skinned Caucasian to the black-haired Malay, and the black-skinned negro, each adapted to some special climate. Our standard of sensible temperatures must be modified to suit each of these different natures.

It is generally supposed that the blacks enjoy hot climates, but the white race cold climates; but so far as my observation goes it is easy to find here the weather so hot that the blacks do not enjoy it, or so cold that the whites do not enjoy it. It is probable that there is only a narrow range of temperature, moisture, and wind that is really perfectly enjoyable to each race. Without specifying any particular formula by which to combine atmospheric pressure, temperature, moisture, and wind into one figure that shall represent the so-called sensible temperature, I would prefer requesting those interested in this subject to simply make a note of the fact whenever they feel like saying "well this weather is just perfect." I have personally made a number of records of this kind in summer and winter. Having noted that my general sensation is that of a delightful atmospheric influence, I have then examined the temperature, pressure, and the wind at the spot where I happened to be in order to ascertain, if possible, which was the important meteorological element in bringing about this pleasant condition. All such results can be charted in a little diagram. On the left hand side is a vertical scale of relative humidities from zero up to a hundred, at the bottom is a horizontal scale of air temperatures from minus ten on the left up to a hundred on the right. At the proper point on this diagram I enter a 5 to indicate the fact that on one occasion I was very comfortable when a 5-mile wind was blowing and the temperature was 80° and the relative humidity 20°. At another time I enter a 5 to indicate that I was also perfectly comfortable in a 5-mile wind with a temperature of 40° and relative humidity of 60°, but a temperature of 20° and a humidity of 80° with a 5-mile wind seemed very raw. I join the first two points on my diagram by a straight line. I might prolong it so that it would pass through the third point, but while the first point of the line represented comfort the latter part of the line

represented discomfort. If now I curve the line to the right as the humidities increase, I find that with a temperature of 60° and a humidity of 80° and a 5-mile wind I am also comfortable. If I prolong the line further, it reaches the point where the temperature is 80° and the humidity nearly 100°, but here I am again uncomfortable, with a feeling of suffocation. In this way I try my way around over the diagram until I have drawn a curve, a sort of parabolic curve, connecting all the temperatures and humidities that produce a feeling of perfect comfort when a 5-mile wind is blowing. A similar curve may be drawn for a 1-mile wind. There is almost no curve for absolute calm. A 20 or 30 mile curve of comfort is confined to that region of the chart where the relative humidity is quite high.

A series of curves like this give one a clearer view of the relation between our sensations and the atmospheric conditions than any other method that I know of. It does not answer the query, how shall I compute the sensible temperature, but it does better than this in that it enables each person to make for himself his own personal diagam of what may be called sensible temperature curves. He may, for instance, draw one curve for extremely raw cold sensations, another for suffocating hot, another for stimulating or irritating dry sensations. A series of curves like these for various parts of our country and for persons of very different temperaments will constitute a most important contribution toward the eventual discovery of a method of computing and predicting the sensations of temperature, which, as is readily seen, is not temperature at all, but a nervous sensation of very complex origin.

## SENSATIONAL METEORIC STORY.

In a New York paper of September 10 there appeared a remarkable story of a meteoric shower at Mill River, Jamaica, which was said to have occurred on August 30. On calling the attention of Mr. Maxwell Hall to this matter, he, as government meteorologist for Jamaica, replies as follows:

In the Gleaner (a Jamaica newspaper) of the 31st of August there was an account, given by a lady, of a supposed meteoric fall at her house on the 20th of August.

I wrote her September 1, but did not receive a reply until the 13th.

The whole thing was a mistake; lightning struck a tree close to her house with an explosive effect; it may have been "ball" lightning. She wrote me that the little stones noticed at first are to be found all through the district; and they seem to me to be very small waterworn pebbles. I have, however, taken steps to have them analyzed.

The account given in the New York paper is shamefully exaggerated.

It would seem that the sensational dispatch from Kingston to the New York paper was intended especially to tickle the palate of the American reader. We are so accustomed to wonders in these days of great human inventions, we hear so much about the multimillionaire syndicates, the latest wonders in electricity, the fastest ships, and the wonderful guns, that the active newspaper correspondents have determined that nature shall not be outdone by man and have undertaken to assist her to perform miracles. They rarely describe any ordinary meteorological phenomenon without exaggerating it to such an extent and incorporating so much of the products of their own vivid imagination that one scarcely recognizes the kernel of truth in the mass of verbiage.

## INCREASE AND DECREASE OF FRESH WATER LAKES.

The Editor has lately received a letter inquiring what are the recognized years in which lakes attain their maximum and their minimum extent. This query sounded at first as though there might be in some part of our country a recognized periodic increase and decrease of the lakes. Fluctuations of some kind undoubtedly occur everywhere throughout the world and depend upon the balance between accumulated rainfall and accumulated evaporation. There is no reason for a regular or chronological periodicity. It can hardly be said that periodic fluctuations in rainfall alone would have anything like corresponding fluctuations in the height of water in large lakes, although this might be the case for small ponds. Many years ago the Editor made a calculation based on the best data accessible to him, showing that the annual fluctuation in the level of the water in Yellowstone Lake exactly followed the accumulated sum of the rainfall minus the evaporation. In this calculation he was much impressed with the uniformity of the outflow from this, and in fact from every large lake. A large change in the height of the lake level produces only a small change in the rate of outflow, so that months and even years may be required to counterbalance the influence of a special rainy season. In Europe some attempts have been made to connect fluctuations of lakes with the rainfall, but no periodicity that has been deduced for that part of the world can be said to hold good for America. In this country too many important changes are being made by human agencies to enable us to make any simple connection between the meteorological phenomena and the levels of the smaller lakes. For instance, in California, according to a newspaper paragraph, extracted from The Hanford Sentinel, Lake Tulare, which should have an area of at least three hundred square miles, is now as "dry as a chip." It is true that this statement is made by the Sentinel on the authority of one person, Mr. W. P. McCord, an old farmer of this region, and the Sentinel adds that:

The reclamation of lake lands has been regularly noted in the columns of this paper for years, but this season has witnessed the most extensive spread of the interests of the husbandman. At the mouths of Cross Creek and Tule River reclamation ditches and levees have been thrown up so that the water that may come with a wet season will be taken care of and an immense area of rich soil irrigated.

It is useless to attempt a meteorological or natural explanation of phenomena such as this, which are mainly due to the artificial conditions of civilization.

## NOT BALL LIGHTNING.

The Pensacola Daily News of August 17 publishes the following paragraph on the authority of Mr. Ross E. Pollock:

Last evening at 8:42 a very luminous object made its appearance in the northeast and moved slowly toward the east, being visible for about two seconds, then disappeared. At the expiration of five seconds a tremendous explosion occurred like that of a big gun.

This interesting item appears as "a meteor," as it properly should, in the regular monthly journal of the Weather Bureau observer at Pensacola, Mr. A. B. Crane; but it is enlarged upon in the Pensacola Daily News by Mr. Pollock, who is a map distributor and not a regular observer, and is spoken of by Mr. Pollock as "probably ball lightning," which it certainly was not. It was an aerolite or small solid substance shooting from the outside interstellar space into the earth's atmosphere and made visible by the heat thus generated. It was seen at places many miles apart, and the lines of sight probably all converged toward a region 50 or 100 miles above the surface of the earth, where this body rapidly pursued its path until it was burned up. The noise, or so-called explosion, of these aerolites appears to be generated in a manner similar to that of the snapping of a whip or the striking together of two hard substances. It may be called an explosive noise, but there is no explosion, properly so called.

On the other hand, ball lightning is always near the ground; the so-called ball seems to roll along the surface of the ground or of some object near the ground, pursuing an irregular course, and eventually bursts with a noise like a pistol. It has never been observed at a greater distance than

500 feet, usually much nearer. It is undoubtedly an electric phenomenon, the exact nature of which is as yet completely unknown.

The calculation of the distance of an aerolite by allowing 1,100 feet for every second of time that elapses between its disappearance and the observed noise of the explosion is quite misleading. The noise originates at every point of the long path described by the aerolite as it rushes through the thin air overhead. A meteor may be in sight for ten seconds, moving majestically across the sky from one side to the other, describing in that time a distance of perhaps 200 miles, but the first sound that we hear comes from that part of the path that is nearest to the observer. Several other remarkable meteors, that is to say, shooting stars or aerolites, were observed during August in Georgia and Alabama, and are noted in the monthly reports of the sections.

Ball lightning is a rare phenomenon. Observers should be carefully on the lookout for it, but must not confound it with shooting stars or other phenomena.

## HEAVY RAIN DURING HURRICANE AT PORT ROYAL, SOUTH CAROLINA.

The voluntary observer, H. D. Elliott, at Port Royal, S. C., reports through Mr. J. W. Bauer, Section Director, the following item with regard to rainfall attending the hurricane of August 30–31, 1898:

On the 30-31st a storm of considerable energy visited the section, reaching its height between 4 and 5 a. m. on the 31st. The maximum wind velocity was estimated to be between 60 and 70 miles per hour, from east to southeast. The precipitation of 10.82 inches during the twenty-four hours ending 8 p. m. on 31st exceeded by 5.89 any daily precipitation ever recorded, and the total of 24.68 for the month exceeded by 9.73 any previous monthly record.

## WATERSPOUTS ON THE LAKES.

In 1889 the Editor had the good fortune to observe about twenty waterspouts one morning as the steamship *Pensacola* was sailing eastward on the southern side of an area of low pressure advancing northeastward toward Nova Scotia. Some account of these spouts was published in a Bulletin of the United States Eclipse Expedition to the west coast of Africa. It is not often that so many spouts are seen on one occasion, but records of five or ten occasionally come to hand. The following is condensed from an account by Capt. James Montgomery and First Mate J. E. Reynolds of the steamer *Kitty M. Forbes*, of their experiences on Saturday, August 13, on Lake Erie. The steamer was about 20 miles east of the Dummy going due east and expecting to touch at Ashtabula. About 8 a. m. a black cloud formed on the starboard quarter. It grew bigger and blacker and rose higher and higher, gaining on the ship and in a little while was off the bow. There was a fresh 10-knot breeze and the sun was shining as bright as could be on the vessel. Suddenly a portion of the cloud seemed to drop toward the water, dropping lower and lower while the surface water of the lake beneath it began to boil and whirl round and round and rise to meet the descending cloud. Then they came together and the cloud seemed to rise again. The spout appeared like a big cable 10 feet in diameter, connecting the great cloud and the lake. It was as black as the cloud. When we got nearer we found that the heavy mist surrounding the spout was descending water, falling like the spray from a fountain. The sun was shining and a rainbow was seen in the falling mists. Before long another part of the cloud began to descend and another section of the lake to boil and rise, and pretty soon there was another waterspout racing alongside of the *Forbes*, a bit closer than the first. The captain ordered on a full head of steam and sheered the vessel off to the northward. While the two black fellows raced along on the starboard side five more big columns of black water were waltzing and swaying along, and at the base of each pillar the surface of the lake was churned into a white foam. Sometimes the columns of water would move along as stiff and straight as a squad of soldiers, and again they would all begin to stagger and swing around in crazy gyrations. After a while the first waterspout began to disappear just as it had formed; the cloud of spray at that point settled lower and lower to the lake surface; then the lower part of the column separated from it and rose and the water once more became quiet. One by one they disappeared until suddenly we found that the biggest one of all having grown still bigger was dead ahead and near at hand. This one did not move as fast as the others, and we steered so as to leave it well to starboard. In an hour and a half after the first appearance the show was all over and the sky as clear as before.

Mr. Reynolds says: "Our greatest fear was that the spouts might collide and go to pieces, causing a sudden fall of tons of water upon the vessel." But so far as we understand the nature of the waterspout, the Editor sees no reason to apprehend danger from this source. A rather heavy rain will fall from the spray hurled up at the foot of the spout, but the spout itself is not made of solid water. It is primarily a cloud due to the low barometric pressure in the center of the whirling mass of air. There may be also a little spray sucked inward and upward. If the whirl ceases, the cloud disappears instantly, and the spray or rain that falls from it is not severe enough to do any injury to a well built vessel. There are many records of vessels that have run into such squalls. The wind may tear away a sail but the rainfall is not at all serious.

Our Great Lakes seem to be as subject to waterspouts as the warm waters of the Gulf of Mexico and of our Atlantic coast. The general explanation of the phenomenon of the spout is given in a very satisfactory manner in Professor Ferrel's Meteorological Researches Nos. I–III. and is reproduced in his recent advances. One of the best opportunities to photograph and measure a waterspout that has ever occurred took place in Nantucket Sound in August, 1896. Fortunately many photographs and descriptions were obtained and an elaborate study of this spout has been in progress in connection with the work of Prof. F. H. Bigelow on the reduction of cloud observations.

Other similar positive additions to our knowledge are very much desired and can be made by any observer who will secure photographs from several different points of view and especially accurate measurements of apparent angular altitudes and azimuths.

## LUNAR RAINBOW.

According to the Daily Register of Mobile, a fine specimen of the lunar rainbow was seen at that place about 7:30 p. m. July 31. The full moon had reached an altitude of about 45° in the east and the rainbow was plainly seen on the dark bank of leaden clouds in the northwest.

The Editor is very much pleased with the calm, judicious, and dignified manner in which the Mobile Register recorded this interesting phenomenon. There was nothing sensational or extravagant in the description. There was not even a single error from a meteorological point of view; it was not called "a heavenly display," "a celestial visitor," "ball lightning," or "a direful portent." The proprietor of the Register, Col. John L. Rapier, evidently understands what is due to his readers in the way of good English and sound meteorology, and we could wish there were many more such.

## RECENT EARTHQUAKES.

*August* 1.—At Port au Prince, Haiti, one minute before noon, a very slight shock.

*August* 7.—San Francisco, Oakland, Berkeley, and Alameda, very slight shock just before noon, noticed principally by means of delicate seismographs. At Berkeley the shock occurred at 11:58, and the seismographs on the campus of the university recorded a movement from south to north without any perceptible vertical motion. The cable report from Messina, Italy, records a severe earthquake at that place at 2:33 a. m. of August 6, which would be about 4:30 p. m. of August 5, San Francisco time, so that this shock could not be the same as that felt in California on the 7th.

*August* 12.—Seattle, Wash: Two slight shocks of about four seconds duration were felt during the night of the 12–13th.

*August* 27.—By cablegram to the New York World, it appears that four earthquake shocks occurred at Santiago de Cuba between 11:10 and 11:15 a. m. of this date.

Seismographs at Washington, D. C., and Cleveland, Ohio, recorded no shocks during August.

## EARTHQUAKES IN CENTRAL AND SOUTH AMERICA.

The "Antonio Alzate" Society, of the City of Mexico, in its memoirs, has published two papers by F. de Montessus de Ballore, Chief of Artillery, in one of which he describes the earthquakes of Mexico, and in the second, those of Spanish America from the Isthmus of Tehauntepec to Cape Horn. This latter immense region he divides into six seismic centers, which he arranges in the order of decreasing seismicity as follows:

No. 1. Central America: This embraces six special regions, including 108 localities in which the record of earthquakes enumerates 2,659 shocks. The seismic action is in general clearly localized or restricted to the Pacific slope.

No. 2. The northern Andes, including Trinidad, Panama, and Guayaquil. This includes ten seismic regions, 117 localities, and 1,385 shocks.

No. 3. The central Andes, including Chile and the eastern Cordilleras in Bolivia. We have here four seismic regions, 61 localities, and 2,884 shocks.

No. 4. The southern Andes, extending to Cape Horn, including 5 regions, 72 localities, and 2,956 shocks.

No. 5. The Atlantic coast of South America, including 2 regions, 29 localities, and 56 shocks.

No. 6. The Antilles: One region, 20 localities, and 157 shocks.

The minor regions, of which there are 28 in all, are also arranged by Montessus de Ballore in the order of seismic activity, as follows: Salvador, Costa Rica, northern Chile, Guatemala, Panama, central coast of Peru, Paria, Venezuela proper, Quito, central Chile, southern Chile, Tucuman, southern coast of Peru, Haiti, and San Domingo, Venezuelan Andes, and finally Guayaquil.

## THE AUSTRALIAN WEATHER GUIDE.

According to an article in the last number of the Journal of the Manchester Geographical Society, the Government of Queensland, Australia, has decided "to publish a thoroughly scientific almanac dealing principally with the new science of meteorology." This publication is to be edited by Mr. Clement L. Wragge, the energetic Chief of the Brisbane Meteorological Office. Mr. Wragge in his note concerning this "Weather Guide" says:

> It will appeal to the sympathies of the squatter, the farmer, the agriculturist, horticulturist, the miner, and particularly the sailor and the invalid. It will show how forecasts are made, and give examples of the conditions that precede transcontinental rains, thunderstorms, cold spells, southerly busters, tropical hurricanes, and other interesting phenomena.
>
> The principal meteorological instruments will be described and directions given for their use. We shall investigate the depths of the antarctic V-shaped depressions which are like atmospheric valleys attached to the low belts of low pressure around the antarctic circle. We shall, in mind, accompany some noble vessel under the influence of such a storm and see the conditions under which the upper topsail-yards are sent up to the cheery chanty of "Reuben Ranzo." Paragraphs will be devoted to horticulture operations. * * * We shall not forget our friends the bushmen, the lonely swagmen, and the teamsters, for whom we have a profound respect.

These eloquent words suggest an excellent field of activity for some of our own voluntary observers and section directors. The almanac is still the guide and friend to the farmer and planter, and if its scientific articles are not written in too technical and too abstruse a style, a Weather Bureau almanac would be highly useful in the homes of our farmers. Of course, its editor would not make the mistake of attempting long range predictions, or any other non-scientific display of his wisdom, but within certain limitations an annual meteorological almanac would be a worthy companion to the monthly section report for each State.

Mr. Alva Agee, in an article in the National Stockman and Farmer of August 4, has well said:

> In view of the weather's unpopularity, it is remarkable that there is such a general craving for foreknowledge of its character for future months that fakirs can make money out of this craving. Almanacs have suffered great loss in circulation in recent years, and their weather predictions have been supplanted in the public's affection by the predictions of a few fakirs or prophets as published in many of the leading papers. It is a well-known scientific fact that these predictions of weather for weeks or months ahead are the purest guess work, and their publication reflects no credit upon our intelligence as a people.

Of course neither the Australian Weather Guide nor any almanac published by a Weather Bureau official would for a moment encourage a discreditable attempt to pander to the general craze for an insight into the weather of the coming season.

## RIBBON LIGHTNING.

The Weather Bureau has received two very interesting photographs of lightning from Rev. J. Stewart-Smith, rector of St. Mary's Church, Kansas City, Mo. They were taken on July 28, at about 11:30 p. m. The camera was a Premo B, 4 by 5, diaphragm 8. The photographs were taken on a Cramer plate, crown brand, and we regret that the interesting details in these lightning flashes can not easily be reproduced by photogravure processes. By the help of the chimney stack, 72 feet distant from the lens, we are able to infer that the apparent angular diameter of the width of the ribbon flash was about half a degree, but the foreshortening of the ribbon was such that its full width would have subtended an angle of at least 1°. As the lightning flash certainly struck the building and passed very close to the top of the chimney, the actual width of the ribbon must have been not less than 2 feet. We know of but one other photograph of ribbon lightning in which it has been possible to approximate to the width of the ribbon. That gave a width of about 3 feet. The photograph was taken, with the camera looking eastward, from the rear of a rapidly-moving railroad train in Dakota, by Mr. W. T. Jennings, of Philadelphia, who states that he has frequently manufactured ribbon lightning by moving the camera across an oscillating discharge. But photographs of ribbon lightning are not taken in any such way. A discharge of lightning is too fleeting to be influenced by the motion of the camera. With artificial oscillatory discharges one may so control the time of the discharges and the motion of the sensitive film as to produce the appearance of a ribbon;

but no motion of the camera seems likely to explain the many details in these ribbon photographs of natural lightning. On the contrary, there is one flash on Mr. Stewart-Smith's plate that has every indication of being certainly an oscillatory discharge, showing lines of flow identical with those photographed by Professor Trowbridge at Cambridge, and fully maintaining his conclusion, which was also that of Prof. Joseph Henry and J. Ogden Rood, that the lightning flash is an oscillatory discharge, repeated frequently to and fro within the crack in the air that is opened up by the first discharge. The whole process requires but a few millionths of a second, and the motion of the camera within that short time is insignificant.

### THE KITE AND TELEPHONE.

On page 257 of the MONTHLY WEATHER REVIEW for June, 1898, we have referred to some interesting experiments on H. M. S. *Dauntless*, concerning which the Aeronautical Journal states that there is no such ship, that no such experiments were made in the navy, and that in recent kite experiments made on the torpedo boat destroyer *Daring* the kites were of the Baden-Powell pattern.

In a letter on this subject from Mr. S. P. Fergusson, of Blue Hill, he says:

> The only experiments with kite telephones or telephone kites that I know of have been made in this country by Mr. William A. Eddy, of New York, who nearly two years ago succeeded in telephoning and telegraphing over a line held by kites. See Boston Herald, December 7, 1896 (or perhaps New York Herald of same date). It seems that the wire was carried over trees, several roadways or streets, etc., and lowered so that connections were readily made and messages sent. After all, the Americans are still ahead in the matter of kites for scientific purposes.

### A MEMORIAL TO VOLTA.

The study of electricity begins with the discoveries of Galvani and Volta, especially the invention of the dry pile by the latter. The electricians of Italy announce that they have organized a committee, with a central office in Milan, to organize an international electrical exposition, to be held at Como, on Lake Como, in May, 1899, to which they invite the cooperation of telegraphers and electricians throughout the world. It is proposed to deposit a bronze crown at the foot of the statue of Volta that his native town long since erected to the celebrated electrician. A more delicate tribute could scarcely be imagined, and the Americans who may be able to be present at the ceremony will undoubtedly witness one of the most beautiful scenes of this century of centennials.

### STUDIES OF THE JAPAN CURRENT.

We notice in several California papers earnest articles advocating the study of the Japan current and its relation to the weather of the Pacific coast. Especially does Mr. W. S. Prosser, of Auburn, Cal., state that in 1878 or 1879 he suggested this very thing and urged favorable action on the authorities at Washington.

It ought hardly to be necessary to assure the citizens of the Pacific coast that the Japan Current, like the Gulf Stream, has been studied with much care by the navigators of all nations, and charts have been published showing the temperature and the movement of the surface water, not only for these special currents, but for the whole of the surrounding ocean for each month in the year. These charts show that without any doubt whatever the currents as such soon dwindle away, and all that is left is a very slow movement of the water too and fro with the wind. It is the west wind that strikes our Pacific coast, and not the Japan Current. This wind brings moisture from the Pacific Ocean, and not from the neighborhood of Japan. It is these moist winds, and not the ocean currents that control the climate of California.

The hydrographic offices of all nations are engaged in the study of ocean currents and surface drifts as such, including their dependence upon the winds. The meteorologist studies the winds as affected by the surfaces of the land and ocean, but he finds the atmosphere moving so rapidly and its various portions so easily intermixed with each other that it is at present impossible to tell whether the moisture brought by the wind to California comes from the Pacific Ocean in general, or from the Japan Current especially. In fact, it matters little to him where it comes from. He has to take it as he finds it over California, and then decide whether it is rising and cooling to form cloud and rain, or whether it is descending and likely to stay unprecipitated. The important features of the weather of California depend principally upon whether its winds are descending and being pushed outward from a high and dry area to the northeastward, or whether they are ascending and coming from moister air to the northwestward. It is the air supplied from the high pressure area on the southwest between California and Hawaii that gives the former her long continued spells of dry, clear weather. The length of these spells may depend, in a general way, upon atmospheric conditions; not on the condition of the ocean.

## METEOROLOGICAL TABLES AND CHARTS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

Table I gives, for about 130 Weather Bureau stations making two observations daily and for about 20 others making only one observation, the data ordinarily needed for climatological studies, viz, the monthly mean pressure, the monthly means and extremes of temperature, the average conditions as to moisture, cloudiness, movement of the wind, and the departures from normals in the case of pressure, temperature, and precipitation, the total depth of snowfall, and the mean wet-bulb temperatures. The altitudes of the instruments above ground are also given.

Table II gives, for about 2,700 stations occupied by voluntary observers, the highest maximum and the lowest minimum temperatures, the mean temperature deduced from the average of all the daily maxima and minima, or other readings, as indicated by the numeral following the name of the station; the total monthly precipitation, and the total depth in inches of any snow that may have fallen. When the spaces in the snow column are left blank it indicates that no snow has fallen, but when it is possible that there may have been snow of which no record has been made, that fact is indicated by leaders, thus (....).

Table III gives, for about 30 stations furnished by the Canadian Meteorological Service, Prof. R. F. Stupart, director, the means of pressure and temperature, total precipitation and depth of snowfall, and the respective departures from normal values, except in the case of snowfall.

Table IV gives, for 26 stations selected out of 113 that maintain continuous records, the mean hourly temperatures de-

duced from the Richard thermographs described and figured in the Report of the Chief of the Weather Bureau, 1891–92, p. 29.

Table V gives, for 26 stations selected out of 104 that maintain continuous records, the mean hourly pressures as automatically registered by Richard barographs, except for Washington, D. C., where Foreman's barograph is in use. Both instruments are described in the Report of the Chief of the Weather Bureau, 1891–92, pp. 26 and 30.

Table VI gives, for about 130 stations, the arithmetical means of the hourly movements of the wind ending with the respective hours, as registered automatically by the Robinson anemometer, in conjunction with an electrical recording mechanism, described and illustrated in the Report of the Chief of the Weather Bureau, 1891–92, p. 19.

Table VII gives, for all stations that make observations at 8 a. m. and 8 p. m., the four component directions and the resultant directions based on these two observations only and without considering the velocity of the wind. The total movement for the whole month, as read from the dial of the Robinson anemometer, is given for each station in Table I. By adding the four components for the stations comprised in any geographical division the average resultant direction for that division can be obtained.

Table VIII gives the total number of stations in each State from which meteorological reports of any kind have been received, and the number of such stations reporting thunderstorms (T) and auroras (A) on each day of the current month.

Table IX gives, for about 70 stations, the average hourly sunshine (in percentages) as derived from the automatic records made by two essentially different types of instruments, designated, respectively, the thermometric recorder and the photographic recorder. The kind of instrument used at each station is indicated in the table by the letter T or P in the column following the name of the station.

Table X gives a record of rains whose intensity at some period of the storm's continuance equaled or exceeded the following rates:

| Duration, minutes.. | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 80 | 100 | 120 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rates pr. hr. (ins.).. | 3.00 | 1.80 | 1.40 | 1.20 | 1.08 | 1.00 | 0.94 | 0.90 | 0.86 | 0.84 | 0.75 | 0.60 | 0.54 | 0.50 |

In the northern part of the United States, especially in the colder months of the year, rains of the intensities shown in the above table seldom occur. In all cases where no storm of sufficient intensity to entitle it to a place in the full table has occurred, the greatest rainfall of any single storm has been given, also the greatest hourly fall during that storm.

Table XI gives the record of excessive precipitation at all stations from which reports are received.

## NOTES EXPLANATORY OF THE CHARTS.

Chart I.—Tracks of centers of high areas. The roman letters show number and order of centers of high areas. The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the 8 a. m. and 8 p. m., seventy-fifth meridian time, observations. The queries (?) on the tracks show that the centers could not be satisfactorily located. Within each circle is given the highest barometric reading reported near the center. A blank indicates that no reports were available. A wavy line indicates the axis of a ridge of high pressure.

Chart II.—Tracks of centers of low areas. The roman letters show number and order of centers of low areas. The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the 8 a. m. and 8 p. m., seventy-fifth meridian time, observations. The queries (?) on the tracks show that the centers could not be satisfactorily located. Within each circle is given the lowest barometric reading reported near the center. A blank indicates that no reports were available. A wavy line indicates the axis of a trough or long oval area of low pressure.

Chart III.—Total precipitation. The scale of shades showing the depth of rainfall is given on the chart itself. For isolated stations the rainfall is given in inches and tenths, when appreciable; otherwise, a "trace" is indicated by a capital T, and no rain at all, by 0.0.

Chart IV.—Sea-level isobars and isotherms, and resultant winds. The wind directions on this Chart are the computed resultants of observations at 8 a. m. and 8 p. m., daily; the resultant duration is shown by figures attached to each arrow. The temperatures are the means of daily maxima and minima and are reduced to sea level. The pressures are the means of 8 a. m. and 8 p. m. observations, daily, and are reduced to sea level and to standard gravity. The reduction for 30 inches of the mercurial barometer, as formerly shown by the marginal figures for each degree of latitude, has already been applied.

Chart V.—Hydrographs for seven principal rivers of the United States.

Chart VI.—Surface temperatures; maximum, minimum, and mean. Lines of equal monthly mean temperature in red; lines of equal maximum temperature in black; and lines of equal minimum temperature (dotted) also in black.

Chart VII.—Percentage of sunshine. The average cloudiness at each Weather Bureau station is determined by numerous personal observations during the day. The difference between the observed cloudiness and 100, it is assumed, represents the percentage of sunshine, and the values thus obtained have been used in preparing Chart VII.

TABLE I.—*Climatological data for Weather Bureau Stations, August, 1898.*

| Stations | Elevation of instruments. | | | Pressure, in inches. | | | Temperature of the air, in degrees Fahrenheit. | | | | | | | | Mean wet thermometer. | Mean temperature of the dew-point. | Mean relative humidity, per cent. | Precipitation, in inches. | | | Wind. | | | | | Clear days. | Partly cloudy days. | Cloudy days. | Average cloudiness, tenths. | Total snowfall. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Barometer above sea level, feet. | Thermometers above ground. | Anemometer above ground. | Mean actual, 8 a. m. and 8 p. m. + 2. | Mean reduced. | Departure from normal. | Mean max. and min. + 2. | Departure from normal. | Maximum. | Date. | Mean maximum. | Minimum. | Date. | Mean minimum. | Greatest daily range. | | | | Total. | Departure from normal. | Days with .01, or more. | Total movement, miles. | Prevailing direction. | Maximum velocity. Miles per hour. | Maximum velocity. Direction. | Maximum velocity. Date. | | | | | |
| *New England.* | | | | | | | 69.7 | + 2.5 | | | | | | | | | 83 | 4.73 | + 0.8 | | | | | | | | | | 5.8 |
| Eastport | 76 | 69 | 74 | 29.87 | 29.96 | — .01 | 61.2 | + 0.6 | 81 | 9 | 69 | 49 | 29 | 54 | 28 | 57 | 56 | 87 | 2.15 | — 1.3 | 12 | 4,729 | s. | 26 | s. | 29 | 4 | 9 | 18 | 7.3 |
| Portland, Me | 103 | 81 | 89 | 29.83 | 29.93 | — .05 | 69.8 | + 3.0 | 88 | 12 | 69 | 54 | 29 | 62 | 25 | 64 | 61 | 79 | 3.88 | + 0.1 | 15 | 4,358 | w. | 25 | s. | 29 | 5 | 14 | 12 | 6.4 |
| Northfield | 872 | 15 | 65 | 29.06 | 29.97 | — .01 | 66.0 | + 3.1 | 85 | 4 | 77 | 38 | 28 | 55 | 25 | 62 | 60 | 84 | 5.22 | + 0.6 | 15 | 5,317 | s. | 35 | nw. | 17 | 2 | 19 | 10 | 6.7 |
| Boston | 125 | 115 | 181 | 29.85 | 29.98 | — .01 | 73.1 | + 4.0 | 94 | 24 | 81 | 55 | 29 | 65 | 25 | 65 | 64 | 77 | 6.38 | + 2.0 | 12 | 7,062 | w. | 29 | nw. | 23 | 11 | 10 | 10 | 5.4 |
| Nantucket | 14 | 43 | 54 | 30.00 | 30.01 | — .01 | 70 6 | + 2.9 | 83 | 2 | 76 | 56 | 29 | 66 | 16 | 68 | 67 | 93 | 2.20 | — 1.0 | 9 | 5,838 | sw. | 31 | nw. | 5 | 5 | 16 | 10 | 6.5 |
| Woods Hole | 22 | 51 | 57 | ..... | ..... | ..... | 70.4 | + 2.2 | 82 | 3 | 74 | 58 | 28 | 66 | 13 | .... | .... | .... | 5.10 | + 1.2 | 9 | 9,271 | sw. | 40 | n. | 5 | 14 | 10 | 7 | 4.4 |
| Vineyard Haven | ..... | 30 | .... | ..... | ..... | ..... | 73.2 | + 2.3 | 87 | 3 | 80 | 56 | 29 | 66 | 20 | .... | .... | .... | 4.77 | + 0.7 | 10 | ..... | sw. | ... | ..... | ... | 7 | 14 | 10 | .... |
| Block Island | 37 | 39 | 48 | 29.99 | 30.02 | + .01 | 69.6 | + 1.6 | 81 | 31 | 74 | 59 | 27 | 66 | 15 | 67 | 65 | 88 | 7.69 | + 4.2 | 14 | 9,034 | sw. | 37 | ne. | 5 | 10 | 14 | 7 | 4.6 |
| Narragansett | ..... | 10 | .... | ..... | ..... | ..... | 71.0 | + 2.6 | 85 | * | 78 | 53 | 28 | 64 | 23 | .... | .... | .... | 3.72 | — 0.1 | 8 | ..... | sw. | ... | ..... | ... | 22 | 4 | 5 | .... |
| New Haven | 107 | 118 | 140 | 29.89 | 30.00 | — .02 | 72.4 | + 2.4 | 90 | 31 | 80 | 54 | 28 | 64 | 22 | 68 | 66 | 84 | 6.65 | + 1.5 | 12 | 5,178 | sw. | 30 | nw. | 17 | 10 | 15 | 6 | 5.0 |
| *Mid. Atlan. States.* | | | | | | | 75.7 | + 2.4 | | | | | | | | | 83 | 6.01 | + 1.4 | | | | | | | | | | 5.1 |
| Albany | 97 | 84 | 113 | 29.89 | 30.00 | + .01 | 73.1 | + 2.6 | 92 | 31 | 82 | 51 | 28 | 64 | 27 | 65 | 63 | 78 | 6.67 | + 2.6 | 19 | 4,634 | s. | 36 | w. | 24 | 5 | 12 | 14 | 6.6 |
| Binghamton | 875 | 79 | 90 | ..... | ..... | ..... | 70.4 | + 3.2 | 90 | 24 | 80 | 43 | 28 | 60 | 30 | .... | .... | .... | 6.48 | + 2.5 | 15 | 3,317 | sw. | 33 | sw. | 17 | 7 | 16 | 8 | 5.7 |
| New York | 314 | 298 | 326 | 29.69 | 30.01 | — .01 | 74.3 | + 2.0 | 90 | 31 | 80 | 60 | 28 | 68 | 17 | 68 | 65 | 78 | 3.12 | — 1.6 | 10 | 7,500 | sw. | 48 | nw. | 17 | 6 | 15 | 10 | 5.8 |
| Harrisburg | 377 | 94 | 104 | ..... | ..... | ..... | 74.2 | + 2.1 | 92 | 31 | 82 | 54 | 28 | 66 | 22 | .... | .... | .... | 8.44 | + 3.9 | 13 | 3,641 | w | 25 | nw. | 3 | 10 | 11 | 10 | 5.5 |
| Philadelphia | 117 | 168 | 184 | 29.90 | 30.02 | — .01 | 76.8 | + 3.0 | 93 | 31 | 84 | 60 | 28 | 69 | 20 | 70 | 66 | 75 | 9.06 | + 4.7 | 13 | 6,165 | sw. | 38 | nw. | 17 | 9 | 13 | 9 | 5.4 |
| Atlantic City | 52 | 68 | 76 | 29.98 | 30.08 | + .02 | 74.2 | + 2.4 | 91 | 25 | 79 | 60 | 28 | 69 | 23 | 70 | 69 | 87 | 3.99 | — 0.8 | 6 | 6,861 | sw. | 42 | nw. | 5 | 14 | 13 | 4 | 4.3 |
| Cape May | 24 | 52 | 70 | 30.02 | 30.04 | ..... | 74.3 | + 1.1 | 83 | 2 | 77 | 65 | 28 | 71 | 11 | .... | .... | .... | 4.77 | — 0.8 | 7 | 8,734 | s. | 44 | w. | 5 | 15 | 8 | 8 | 3.8 |
| Baltimore | 123 | 68 | 82 | 29.80 | 30.02 | — .01 | 77.4 | + 2.5 | 95 | 31 | 86 | 59 | 28 | 69 | 25 | 70 | 67 | 74 | 6.09 | + 2.0 | 11 | 3,164 | sw. | 20 | n. | 18 | 13 | 12 | 6 | 4.2 |
| Washington | 112 | 59 | 76 | 29.92 | 30.03 | — .01 | 76.9 | + 2.3 | 93 | 3 | 86 | 57 | 28 | 68 | 25 | 70 | 68 | 80 | 8.76 | + 4.8 | 8 | 3,575 | s. | 30 | s. | 4 | 10 | 16 | 5 | 5.0 |
| Cape Henry | ..... | 5 | 34 | ..... | ..... | ..... | 79.6 | + 3.2 | 97 | 25 | 87 | 69 | * | 72 | 25 | .... | .... | .... | 3.45 | — 2.1 | 15 | ..... | s. | ... | ..... | ... | 4 | 17 | 10 | .... |
| Lynchburg | 685 | 83 | 88 | 29.34 | 30.06 | + .03 | 77.2 | + 1.9 | 95 | 23 | 86 | 64 | 6 | 68 | 25 | 71 | 69 | 82 | 2.82 | — 1.2 | 10 | 2,271 | sw. | 22 | se. | 4 | 13 | 10 | 8 | 4.9 |
| Norfolk | 57 | 88 | 93 | 30.01 | 30.07 | + .05 | 79.6 | + 3.0 | 94 | 2 | 87 | 69 | 29 | 72 | 22 | 74 | 72 | 87 | 8.48 | + 2.4 | 12 | 5,241 | sw. | 34 | sw. | 25 | 16 | 10 | 5 | 3.9 |
| Richmond | 144 | 98 | 105 | ..... | ..... | ..... | 78.8 | ..... | 95 | 25 | 88 | 65 | 32 | 70 | 25 | .... | .... | .... | 6.31 | ..... | 12 | 4,405 | s. | 34 | sw. | 4 | 4 | 21 | 6 | 5.8 |
| *S. Atlantic States.* | | | | | | | 79.6 | + 1.1 | | | | | | | | | 86 | 8.81 | + 2.0 | | | | | | | | | | 6.1 |
| Charlotte | 773 | 68 | 76 | 29.26 | 30.05 | + .03 | 77.2 | + 1.1 | 92 | 23 | 86 | 65 | 28 | 69 | 23 | 72 | 70 | 86 | 8.74 | + 3.4 | 22 | 4,273 | s. | 28 | se. | 4 | 5 | 17 | 9 | 6.4 |
| Hatteras | 11 | 17 | 96 | 30.09 | 30.10 | + .08 | 79.2 | + 1.8 | 87 | 9 | 84 | 69 | 27 | 75 | 14 | 75 | 74 | 86 | 6.48 | + 0.1 | 16 | 7,282 | s. | 32 | sw. | 10 | 13 | 11 | 7 | 4.7 |
| Kittyhawk | 9 | 12 | 30 | ..... | ..... | ..... | 79.1 | + 1.5 | 92 | 25 | 86 | 68 | * | 72 | 20 | .... | .... | .... | 3.13 | — 3.7 | 11 | 8,538 | ..... | ... | ..... | ... | 14 | 9 | 8 | 5.3 |
| Raleigh | 375 | 93 | 101 | 29.69 | 30.07 | + .05 | 78.8 | + 3.1 | 93 | 23 | 87 | 66 | 28 | 71 | 21 | 72 | 71 | 85 | 5.13 | — 2.8 | 21 | 3,767 | sw. | 25 | sw. | 4 | 6 | 13 | 12 | 6.3 |
| Wilmington | 78 | 82 | 90 | 30.02 | 30.10 | + .08 | 79.0 | + 0.8 | 90 | 5 | 85 | 66 | 28 | 73 | 16 | 75 | 73 | 88 | 5.93 | — 1.5 | 20 | 5,200 | sw. | 29 | sw. | 10 | 4 | 12 | 15 | 6.9 |
| Charleston | 48 | 14 | 92 | 30.05 | 30.10 | + .08 | 81.0 | + 0.5 | 90 | 1 | 86 | 72 | 27 | 76 | 14 | 76 | 74 | 84 | 11.34 | + 3.7 | 20 | 7,694 | s. | 52 | e. | 30 | 0 | 20 | 11 | 6.8 |
| Columbia | ..... | 5 | .... | ..... | ..... | ..... | 80.0 | + 1.4 | 94 | 24 | 89 | 69 | 12 | 71 | 22 | .... | .... | .... | 9.85 | + 3.0 | 17 | ..... | sw. | ... | ..... | ... | 5 | 15 | 11 | .... |
| Augusta | 180 | 89 | 103 | 29.87 | 30.06 | + .06 | 79.4 | 0.0 | 93 | 1 | 87 | 69 | 14 | 72 | 20 | 73 | 72 | 86 | 9.25 | + 4.1 | 19 | 3,977 | s. | 26 | ne. | 31 | 5 | 13 | 13 | 6.5 |
| Savannah | 82 | 63 | 89 | 29.98 | 30.06 | + .08 | 80.3 | 0.0 | 92 | 1 | 87 | 69 | 25 | 73 | 25 | 75 | 74 | 88 | 22.79 | +15.0 | 20 | 5,644 | s. | 26 | nw. | 31 | 6 | 13 | 12 | 6.6 |
| Jacksonville | 43 | 69 | 84 | 30.01 | 30.06 | + .04 | 82.1 | + 1.0 | 94 | 5 | 90 | 70 | 9 | 74 | 22 | 75 | 74 | 86 | 5.44 | — 1.0 | 17 | 5,705 | s. | 36 | se. | 9 | 4 | 22 | 5 | 5.5 |
| *Florida Peninsula.* | | | | | | | 81.4 | — 0.7 | | | | | | | | | 81 | 10.06 | + 3.6 | | | | | | | | | | 4.6 |
| Jupiter | 38 | 13 | 30 | 30.03 | 30.06 | + .01 | 80.8 | — 0.2 | 88 | * | 86 | 71 | 2 | 76 | 14 | 76 | 74 | 81 | 6.62 | + 1.5 | 15 | 7,100 | se. | 34 | e. | 1 | 12 | 16 | 3 | 4.5 |
| Key West | 22 | 43 | 50 | 30.03 | 30.05 | + .04 | 82.5 | — 1.4 | 90 | 29 | 88 | 69 | 8 | 77 | 17 | 76 | 73 | 76 | 5.73 | + 1.0 | 16 | 5,241 | e. | 25 | ne. | 14 | 14 | 14 | 3 | 4.2 |
| Tampa | 36 | 60 | 67 | 30.02 | 30.06 | + .05 | 80.8 | — 0.6 | 93 | 17 | 89 | 70 | 4 | 73 | 22 | 75 | 73 | 86 | 17.83 | + 8.4 | 23 | 4,348 | se. | 30 | se. | 6 | 5 | 23 | 3 | 5.1 |
| *East Gulf States.* | | | | | | | 79 8 | — 0.3 | | | | | | | | | 85 | 9.71 | + 3.8 | | | | | | | | | | 6.3 |
| Atlanta | 1,131 | 92 | 126 | 28.89 | 30.05 | + .01 | 77.2 | + 0.7 | 92 | 22 | 84 | 67 | 29 | 70 | 23 | 72 | 71 | 87 | 6.66 | + 2.0 | 15 | 4,788 | se. | 30 | ne. | 3 | 1 | 12 | 18 | 7.5 |
| Pensacola | 56 | 78 | 90 | 29.95 | 30 01 | .00 | 80.0 | — 0.4 | 92 | 2 | 86 | 71 | 25 | 74 | 18 | 75 | 73 | 83 | 18.58 | +10.2 | 22 | 5,760 | sw. | 40 | sw. | 10 | 0 | 20 | 11 | 6.7 |
| Mobile | 57 | 88 | 96 | 29.96 | 30.02 | + .01 | 80.0 | — 0.3 | 94 | 22 | 87 | 71 | 14 | 73 | 21 | 74 | 73 | 87 | 12.35 | + 5.4 | 23 | 3,692 | n. | 26 | sw. | 17 | 10 | 18 | 3 | 4.5 |
| Montgomery | 221 | 100 | 112 | 29.79 | 30.02 | + .01 | 78.8 | — 1.0 | 93 | 23 | 86 | 70 | 29 | 72 | 21 | 74 | 72 | 87 | 7.92 | + 3.8 | 19 | 4,053 | se. | 28 | n. | 3 | 7 | 11 | 13 | 6.6 |
| Vicksburg | 247 | 65 | 73 | 29.73 | 29.99 | — .03 | 80.8 | + 0.7 | 95 | 24 | 89 | 68 | 4 | 73 | 21 | 75 | 74 | 85 | 2.85 | — 0.7 | 8 | 3,506 | se. | 23 | e. | 4 | 11 | 12 | 8 | 5.0 |
| New Orleans | 54 | 112 | 120 | 29.95 | 30.01 | + .01 | 81.2 | — 0.3 | 91 | 22 | 87 | 72 | 5 | 73 | 17 | 74 | 73 | 82 | 6.24 | + 0.2 | 14 | 4,671 | se. | 25 | nw. | 25 | 0 | 13 | 18 | 7.3 |
| Port Eads | ..... | 27 | ... | ..... | ..... | ..... | 80.4 | — 1.2 | 89 | * | 85 | 70 | 11 | 76 | 14 | .... | .... | .... | 13.39 | + 5.8 | 18 | ..... | s. | .... | ..... | ... | 1 | 18 | 12 | 6.6 |
| *West Gulf States.* | | | | | | | 81.9 | + 1.3 | | | | | | | | | 78 | 3.05 | — 0.6 | | | | | | | | | | 4.6 |
| Shreveport | 249 | 77 | 84 | 29.72 | 29.98 | — .02 | 81.4 | + 0.1 | 96 | 23 | 91 | 68 | 14 | 72 | 23 | 74 | 71 | 78 | 2.91 | + 0.7 | 9 | 3,409 | se. | 26 | e. | 2 | 9 | 13 | 9 | 5.3 |
| Fort Smith | 481 | 63 | 72 | 29.47 | 29.96 | — .01 | 80.4 | + 2.7 | 96 | 21 | 90 | 66 | 13 | 70 | 27 | 72 | 70 | 78 | 6.10 | + 2.4 | 9 | 3,367 | e. | 22 | w. | 2 | 16 | 9 | 6 | 3.8 |
| Little Rock | 302 | 71 | 79 | 29.68 | 30.00 | .00 | 80 2 | + 2.0 | 96 | 23 | 90 | 68 | 5 | 71 | 23 | 73 | 70 | 78 | 2.07 | — 2.1 | 7 | 3,321 | e. | 24 | w. | 24 | 10 | 18 | 3 | 4.5 |
| Corpus Christi | 20 | 42 | 50 | 29.95 | 29.97 | — .03 | 82 5 | + 1.1 | 92 | 29 | 88 | 74 | 31 | 78 | 16 | 77 | 76 | 83 | T. | — 3.1 | 0 | 8,005 | se. | 26 | se. | 5 | 15 | 13 | 3 | 3.8 |
| Galveston | 54 | 85 | 96 | 29.91 | 29 96 | — .03 | 83.2 | 0.0 | 90 | 25 | 88 | 73 | 9 | 79 | 14 | 76 | 74 | 76 | 3.68 | — 1.9 | 13 | 3,750 | se. | 18 | s. | 8 | 8 | 16 | 7 | 5 3 |
| Palestine | 510 | 54 | 61 | 29.44 | 29 97 | — .04 | 81.6 | + 1.2 | 96 | 18 | 92 | 66 | 11 | 71 | 27 | 74 | 73 | 84 | 3.22 | + 0.5 | 7 | 3,401 | se. | 20 | n. | 25 | 13 | 12 | 6 | 4.6 |
| San Antonio | 704 | 95 | 104 | 29.23 | 29.95 | — .03 | 84.0 | + 1.8 | 99 | 25 | 94 | 68 | 27 | 74 | 27 | 72 | 68 | 69 | 3.35 | — 0.5 | 8 | 5,455 | se. | 36 | ne. | 26 | 13 | 11 | 7 | 4.7 |
| *Ohio Val. & Tenn.* | | | | | | | 76 8 | + 2.0 | | | | | | | | | 77 | 4.01 | + 0.4 | | | | | | | | | | 4.9 |
| Chattanooga | 762 | 106 | 112 | 29.27 | 30.05 | + .02 | 78.2 | + 2.3 | 95 | 23 | 87 | 66 | 14 | 70 | 26 | 71 | 69 | 79 | 0.83 | — 3.4 | 8 | 3,635 | sw. | 26 | sw. | 8 | 8 | 19 | 4 | 4.7 |
| Knoxville | 1,004 | 10 | 88 | 29.01 | 30.05 | + .01 | 77.5 | + 2.7 | 92 | 23 | 88 | 63 | 27 | 68 | 25 | 70 | 68 | 80 | 4.86 | + 0.8 | 8 | 3,717 | ne. | 30 | s. | 9 | 14 | 11 | 6 | 4.1 |
| Memphis | 399 | 140 | 154 | 29 60 | 30.01 | .00 | 79.8 | + 1.1 | 95 | 22 | 88 | 66 | 5 | 72 | 30 | 73 | 71 | 80 | 2.69 | — 0.9 | 7 | 4,422 | nw. | 40 | nw. | 18 | 14 | 12 | 5 | 3.9 |
| Nashville | 545 | 128 | 134 | 29.45 | 30.01 | + .01 | 78.2 | + 0.7 | 94 | 23 | 88 | 63 | 14 | 69 | 25 | 70 | 67 | 74 | 6.56 | + 3.2 | 5 | 3,056 | nw. | 25 | sw. | 8 | 21 | 8 | 2 | 2.7 |
| Lexington | 989 | 75 | 104 | 28.98 | 30.00 | — .02 | 75.8 | + 1.9 | 92 | 31 | 85 | 60 | 28 | 66 | 26 | 71 | 69 | 84 | 2.99 | — 0.6 | 10 | 4,958 | sw. | 40 | sw. | 24 | 11 | 11 | 9 | 5.0 |
| Louisville | 525 | 114 | 136 | 29.45 | 30.01 | .00 | 78.2 | + 1.9 | 96 | 22 | 88 | 63 | 14 | 69 | 25 | 69 | 66 | 73 | 5.14 | + 1.6 | 9 | 3,865 | s. | 30 | s. | 2 | 16 | 9 | 6 | 4.6 |
| Evansville | 434 | 72 | 82 | ..... | ..... | ..... | 77.8 | ..... | 95 | 22 | 87 | 61 | 13 | 69 | 24 | .... | .... | .... | 3.85 | ..... | 8 | 3,401 | s. | 28 | n. | 24 | 17 | 10 | 4 | 3.5 |
| Indianapolis | 823 | 154 | 164 | 29.15 | 30.00 | — .03 | 74.6 | + 1.0 | 94 | 23 | 84 | 59 | 28 | 66 | 25 | 67 | 63 | 72 | 2.63 | — 0.6 | 8 | 5,234 | sw. | 42 | sw. | 2 | 6 | 17 | 8 | 5.8 |
| Cincinnati | 628 | 152 | 157 | 29.86 | 30.01 | — .01 | 76.8 | + 1.8 | 94 | 23 | 85 | 61 | 28 | 68 | 24 | 69 | 65 | 72 | 2.61 | — 1.1 | 7 | 4,052 | sw. | 30 | w. | 24 | 18 | 10 | 3 | 3.7 |
| Columbus | 824 | 87 | 100 | 29.14 | 29.99 | — .02 | 75.0 | + 2.7 | 94 | 23 | 84 | 54 | 28 | 65 | 30 | 68 | 66 | 81 | 7.16 | + 3.9 | 12 | 4,175 | sw. | 27 | w. | 24 | 14 | 12 | 5 | 4.6 |
| Pittsburg | 842 | 116 | 123 | 29.13 | 30.00 | — .02 | 74.9 | + 2.1 | 92 | 23 | 83 | 56 | 28 | 67 | 24 | 67 | 64 | 74 | 4.01 | + 0.8 | 12 | 3,548 | sw. | 22 | w. | 17 | 4 | 19 | 8 | 6.0 |
| Parkersburg | 638 | 77 | 84 | 29.36 | 30.03 | — .02 | 75.8 | + 3.7 | 94 | 23 | 86 | 56 | 28 | 66 | 29 | 69 | 67 | 81 | 4.66 | + 0.7 | 11 | 2,921 | se. | 35 | nw. | 3 | 10 | 9 | 12 | 5.6 |
| *Lower Lake Region.* | | | | | | | 71.8 | + 2.4 | | | | | | | | | 76 | 3.23 | + 0.2 | | | | | | | | | | 5.7 |
| Buffalo | 768 | 178 | 206 | 29.16 | 29.96 | — .03 | 71.1 | + 2.6 | 86 | 2 | 77 | 49 | 28 | 65 | 31 | 66 | 63 | 77 | 2.65 | — 0.5 | 8 | 9,532 | sw. | 51 | w. | 3 | 5 | 15 | 11 | 6.2 |
| Oswego | 335 | 76 | 87 | 29.59 | 29.95 | — .05 | 70.4 | + 2.2 | 88 | 31 | 77 | 49 | 28 | 63 | 24 | 64 | 61 | 75 | 3.27 | + 0.6 | 10 | 6,225 | s. | 26 | nw. | 25 | 9 | 9 | 13 | 6.0 |
| Rochester | 523 | 81 | 90 | 29.41 | 29.96 | — .04 | 71.6 | + 3.2 | 92 | 3 | 81 | 47 | 28 | 63 | 31 | 64 | 60 | 72 | 5.05 | + 2.0 | 10 | 5,006 | sw. | 28 | sw. | 23 | 7 | 14 | 10 | 5.9 |
| Erie | 714 | 92 | 102 | 29.24 | 29.98 | — .02 | 71.7 | + 2.2 | 88 | 23 | 78 | 53 | 28 | 65 | 26 | 67 | 64 | 78 | 4.19 | + 0.9 | 11 | 6,079 | sw. | 28 | w. | 17 | 9 | 12 | 10 | 5.7 |
| Cleveland | 762 | 190 | 201 | 29.18 | 29.97 | — .04 | 71.7 | + 2.1 | 92 | 23 | 79 | 54 | 28 | 65 | 26 | 65 | 61 | 72 | 1.79 | — 1.3 | 7 | 7,982 | se. | 34 | s. | 16 | 7 | 21 | 3 | 4.7 |
| Sandusky | 629 | 62 | 74 | 29.32 | 29.98 | — .03 | 73.3 | + 2.3 | 94 | 23 | 82 | 54 | 28 | 65 | 27 | 66 | 63 | 74 | 5.25 | + 2.1 | 10 | 4,646 | sw. | 26 | w. | 17 | 7 | 9 | 15 | 6.5 |
| Toledo | 674 | 122 | 127 | 29.27 | 29.97 | — .03 | 73.0 | + 2.2 | 94 | 23 | 82 | 53 | 27 | 64 | 28 | 66 | 63 | 76 | 1.82 | — 0.9 | 9 | 5,712 | sw. | 27 | sw. | 3 | 13 | 9 | 9 | 5.0 |
| Detroit | 730 | 160 | 166 | 29.21 | 29.97 | — .04 | 72.0 | + 2.3 | 97 | 31 | 80 | 51 | 27 | 64 | 28 | 65 | 62 | 75 | 1.84 | — 0.9 | 5 | 4,799 | sw. | 27 | sw. | 3 | 11 | 10 | 10 | 5.4 |
| *Upper Lake Region.* | | | | | | | 66.6 | + 0.8 | | | | | | | | | 79 | 3.38 | + 0.5 | | | | | | | | | | 5.1 |
| Alpena | 609 | 61 | 65 | 29.31 | 29.96 | — .03 | 64.2 | + 0.7 | 94 | 31 | 73 | 45 | 27 | 56 | 32 | 60 | 58 | 81 | 4.24 | + 0.8 | 12 | 4,912 | nw. | 27 | s. | 28 | 10 | 12 | 9 | 5.6 |
| Grand Haven | 638 | 55 | 64 | 29.30 | 29.96 | — .03 | 67.6 | + 0.6 | 85 | 30 | 76 | 50 | 18 | 59 | 34 | 63 | 60 | 78 | 4.04 | + 1.4 | 8 | 5,656 | sw. | 28 | sw. | 15 | 17 | 9 | 5 | 3.7 |
| Marquette | 734 | 67 | 95 | 29.15 | 29.92 | — .07 | 63.0 | — 0.6 | 82 | 30 | 70 | 45 | 18 | 56 | 30 | 59 | 56 | 78 | 1.16 | — 1.7 | 10 | 5,746 | n. | 38 | s. | 28 | 5 | 16 | 10 | 6.5 |
| Port Huron | 639 | 70 | 108 | 29.30 | 29.97 | — .02 | 70.2 | + 3.2 | 98 | 29 | 79 | 48 | 27 | 61 | 28 | 63 | 60 | 76 | 2.87 | + 0.3 | 11 | 6,261 | s. | 30 | sw. | 23 | 11 | 16 | 4 | 4.8 |
| Sault Ste. Marie | 634 | 58 | 65 | 29.27 | 29.93 | — .06 | 61.6 | + 0.8 | 85 | 31 | 70 | 46 | 13 | 53 | 31 | 57 | 55 | 85 | 4.18 | + 1.4 | 12 | 5,065 | nw. | 27 | nw. | 8 | 8 | 14 | 9 | 5.5 |
| Chicago | 824 | 241 | 274 | 29.12 | 29.98 | — .01 | 71.4 | + 0.5 | 93 | 23 | 78 | 59 | 19 | 65 | 24 | 65 | 62 | 78 | 3.03 | + 0.1 | 9 | 10,876 | ne. | 72 | sw. | 16 | 17 | 9 | 5 | 3.7 |
| Milwaukee | 671 | 106 | 149 | 29.27 | 29.97 | — .03 | 70.0 | + 1.7 | 93 | 23 | 78 | 55 | 18 | 62 | 26 | 65 | 62 | 79 | 4.86 | + 2.1 | 8 | 6,520 | sw. | 28 | sw. | 13 | 6 | 16 | 9 | 5.7 |
| Green Bay | 617 | 49 | 57 | 29.30 | 29.96 | — .05 | 67.4 | + 0.7 | 93 | 31 | 77 | 48 | 27 | 58 | 28 | 61 | 59 | 79 | 2.65 | — 0.2 | 10 | 4,284 | sw. | 24 | sw. | 28 | 8 | 16 | 7 | 5.2 |
| Duluth | 702 | 95 | 106 | 29.18 | 29.92 | — .04 | 64.4 | — 0.3 | 86 | 20 | 70 | 50 | 12 | 58 | 24 | 59 | 56 | 78 | 3.39 | 0.0 | 12 | 6,549 | ne. | 28 | ne. | 22 | 9 | 17 | 5 | 5.1 |
| *North Dakota.* | | | | | | | 67.3 | + 0.9 | | | | | | | | | 64 | 1.43 | — 0.5 | | | | | | | | | | 3.3 |
| Moorhead | 935 | 54 | 60 | 28.92 | 29.91 | — .03 | 65.6 | + 0.4 | 92 | 29 | 79 | 40 | 12 | 52 | 42 | 58 | 55 | 74 | 2.72 | 0.0 | 9 | 6,032 | se. | 38 | se. | 27 | 15 | 12 | 4 | 3.5 |
| Bismarck | 1,674 | 16 | 29 | 28.19 | 29.92 | .00 | 68.8 | + 1.3 | 99 | 19 | 82 | 43 | 12 | 56 | 40 | 58 | 50 | 60 | 1.35 | — 0.6 | 5 | 6,718 | nw. | 38 | nw. | 21 | 21 | 7 | 3 | 3.3 |
| Williston | 1,872 | 15 | 31 | 27.97 | 29.90 | .00 | 67.5 | + 1.0 | 97 | 19 | 82 | 45 | 16 | 53 | 44 | 57 | 49 | 58 | 0.24 | — 0.9 | 2 | 5,806 | n. | 42 | w. | 27 | 19 | 11 | 1 | 3.2 |
| *Upper Miss. Valley.* | | | | | | | 73.0 | + 0.8 | | | | | | | | | 76 | 3.36 | + 0.3 | | | | | | | | | | 4.3 |
| Minneapolis | ..... | 99 | ... | ..... | ..... | ..... | 69.8 | + 0.7 | 97 | 22 | 80 | 50 | 12 | 60 | 33 | .... | .... | .... | 2.60 | — 0.6 | 8 | ..... | s. | .... | ..... | ... | 9 | 16 | 6 | .... |
| St. Paul | 837 | 114 | 124 | 29.05 | 29.93 | — .04 | 69.6 | + 0.5 | 95 | 22 | 80 | 50 | 1 | 59 | 32 | 61 | 57 | 71 | 3.93 | + 0.6 | 8 | 4,358 | nw. | 27 | n. | 14 | 14 | 13 | 4 | 4.4 |
| La Crosse | 730 | 70 | 78 | ..... | ..... | ..... | 69.9 | — 0.2 | 95 | 22 | 81 | 50 | 13 | 59 | 32 | .. | .... | ... | 3.25 | 0.0 | 7 | 3,818 | s. | 22 | sw. | 14 | 9 | 10 | 12 | 5.8 |
| Davenport | 599 | 71 | 79 | 29.31 | 29.94 | — .06 | 73.0 | + 0.2 | 93 | 23 | 82 | 56 | 12 | 64 | 25 | 66 | 64 | 77 | 4.96 | + 1.4 | 12 | 4,360 | sw. | 30 | nw. | 23 | 15 | 6 | 10 | 5.0 |
| Des Moines | 867 | 84 | 88 | 29.06 | 29.96 | — .02 | 73.8 | + 1.8 | 99 | 30 | 85 | 51 | 1 | 63 | 33 | 65 | 62 | 71 | 1.09 | — 2.2 | 5 | 3,886 | sw. | 27 | sw. | 30 | 21 | 6 | 4 | 2.9 |

TABLE I.—*Climatological data for Weather Bureau Stations, August, 1898*—Continued.

| Stations. | Elevation of instruments: Barometer above sea level, feet. | Elevation of instruments: Thermometers above ground. | Elevation of instruments: Anemometers above ground. | Pressure, in inches: Mean actual, 8 a. m. and 8 p. m. + 2. | Pressure, in inches: Mean reduced. | Pressure, in inches: Departure from normal. | Temperature of the air, in degrees Fahrenheit: Mean max. and min. + 2. | Temperature: Departure from normal. | Temperature: Maximum. | Temperature: Date. | Temperature: Mean maximum. | Temperature: Minimum. | Temperature: Date. | Temperature: Mean minimum. | Temperature: Greatest daily range. | Mean wet thermometer. | Mean temperature of the dew-point. | Mean relative humidity, per cent. | Precipitation, in inches: Total. | Precipitation: Departure from normal. | Precipitation: Days with .01, or more. | Wind: Total movement, miles. | Wind: Prevailing direction. | Wind: Maximum velocity: Miles per hour. | Wind: Maximum velocity: Direction. | Wind: Maximum velocity: Date. | Clear days. | Partly cloudy days. | Cloudy days. | Average cloudiness, tenths. | Total snowfall. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Up. Miss. Val.*—Con | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dubuque | 698 | 101 | 109 | 29.22 | 29.95 | — .05 | 71.2 | — 0.4 | 92 | 22 | 81 | 53 | 4 | 62 | 29 | 64 | 61 | 75 | 4.37 | + 1.2 | 11 | 4,300 | nw. | 27 | n. | 15 | 13 | 11 | 7 | 4.3 | |
| Keokuk | 614 | 64 | 78 | 29.32 | 29.96 | — .03 | 75.7 | + 1.2 | 97 | 23 | 84 | 56 | * | 67 | 26 | 68 | 64 | 74 | 6.92 | + 4.1 | 7 | 4,555 | sw. | 20 | sw. | 17 | 17 | 4 | 10 | 4.2 | |
| Cairo | 359 | 87 | 93 | 29.62 | 29.99 | .00 | 78.0 | + 1.0 | 92 | 24 | 86 | 62 | 4 | 70 | 23 | 72 | 71 | 85 | 3.56 | + 0.7 | 9 | 3,525 | s. | 36 | nw. | 24 | 15 | 13 | 3 | 3.8 | |
| Springfield, Ill. | 644 | 82 | 92 | 29.31 | 29.98 | — .04 | 74.6 | + 1.2 | 94 | 23 | 84 | 58 | 12 | 66 | 30 | 67 | 64 | 77 | 4.40 | + 2.0 | 12 | 4,347 | sw. | 22 | e. | 14 | 10 | 13 | 8 | 5.1 | |
| Hannibal | 534 | 75 | 107 | ..... | ..... | ..... | 75.8 | + 1.6 | 96 | 23 | 85 | 56 | 12 | 66 | 29 | ..... | ..... | .... | 1.05 | — 0.9 | 8 | 5,542 | sw. | 25 | s. | 14 | 18 | 11 | 2 | 3.2 | |
| St. Louis | 567 | 111 | 210 | 29.40 | 30.00 | + .01 | 78.4 | + 1.6 | 95 | 21 | 86 | 63 | 4 | 70 | 23 | 72 | 69 | 79 | 0.87 | — 2.6 | 7 | 5,240 | s. | 25 | sw. | 2 | 16 | 8 | 7 | 4.0 | |
| *Missouri Valley.* | | | | | | | 75.1 | + 1.9 | | | | | | | | | | 67 | 2.64 | — 0.6 | | | | | | | | | | 3.3 | |
| Columbia | ..... | 4 | 84 | ..... | ..... | ..... | 77.0 | + 1.9 | 99 | 23 | 89 | 52 | 4 | 65 | 34 | .... | .... | .... | 0.47 | — 2.3 | 6 | 4,350 | s. | 18 | w. | 21 | 16 | 7 | 8 | 4.0 | |
| Kansas City | 963 | 78 | 95 | 28.98 | 29.97 | — .02 | 77.2 | + 1.5 | 96 | 23 | 86 | 59 | 1 | 68 | 23 | 69 | 66 | 73 | 5.01 | + 1.1 | 6 | 5,591 | se. | 24 | s. | 15 | 18 | 10 | 3 | 2.9 | |
| Springfield, Mo | 1,324 | 100 | 103 | 28.63 | 29.99 | .00 | 75.1 | + 1.1 | 90 | 23 | 84 | 58 | 4 | 67 | 21 | 69 | 66 | 80 | 5.63 | + 1.6 | 6 | 4,971 | se. | 24 | se. | 31 | 11 | 18 | 2 | 3.7 | |
| Topeka | ..... | 81 | ..... | ..... | ..... | ..... | 77.6 | + 2.8 | 98 | 29 | 88 | 55 | 3 | 67 | 26 | ..... | ..... | .... | 3.81 | + 0.7 | 6 | ..... | s. | ... | ..... | ... | 17 | 13 | 1 | .... | |
| Lincoln | 1,199 | 74 | 84 | 28.68 | 29.92 | — .05 | 76.3 | + 2.7 | 101 | 20 | 89 | 48 | 1 | 64 | 35 | 66 | 62 | 68 | 3.45 | + 0.4 | 6 | 6,678 | s. | 38 | nw. | 15 | 24 | 6 | 1 | 2.4 | |
| Omaha | 1,103 | 92 | 97 | 28.79 | 29.92 | — .05 | 76.4 | + 2.7 | 100 | 20 | 86 | 55 | 1 | 66 | 28 | 66 | 62 | 66 | 1.98 | — 1.4 | 5 | 5,065 | se. | 24 | se. | 5 | 23 | 4 | 4 | 2.6 | |
| Sioux City | 1,139 | 96 | 164 | ..... | ..... | ..... | 72.5 | + 0.9 | 101 | 30 | 85 | 52 | 3 | 60 | 42 | ... | ... | ... | 3.10 | — 0.7 | 3 | 7,707 | s. | 33 | s. | 4 | 16 | 12 | 3 | 3.6 | |
| Pierre | 1,460 | 50 | 62 | 28.38 | 29.88 | — .06 | 74.4 | + 1.6 | 105 | 27 | 88 | 52 | 11 | 60 | 44 | 61 | 53 | 54 | 0.78 | — 0.9 | 4 | 6,275 | se. | 60 | nw. | 5 | 16 | 9 | 6 | 3.5 | |
| Huron | 1,306 | 56 | 67 | 28.54 | 29.90 | — .05 | 71.2 | + 2.8 | 102 | 30 | 86 | 46 | 12 | 57 | 46 | 60 | 54 | 63 | 0.46 | — 2.1 | 4 | 7,469 | se. | 38 | s. | 27 | 20 | 9 | 2 | 3.7 | |
| Yankton | 1,234 | 52 | 58 | ..... | ..... | ..... | 73.2 | + 1.4 | 100 | 30 | 85 | 52 | 27 | 62 | 37 | .... | .... | ... | 1.71 | — 1.4 | 7 | 5,295 | e. | 30 | sw. | 5 | 18 | 12 | 1 | 3.5 | |
| *Northern Slope.* | | | | | | | 70.4 | + 2.6 | | | | | | | | | | 48 | 0.65 | — 0.7 | | | | | | | | | | 3.6 | |
| Havre | 2,494 | 46 | 47 | 27.30 | 29.82 | — .09 | 70.1 | + 4.5 | 97 | 20 | 85 | 43 | 23 | 55 | 44 | 56 | 46 | 51 | 0.10 | — 1.3 | 3 | 5,949 | w. | 60 | sw. | 21 | 21 | 7 | 3 | 2.6 | |
| Miles City | 2,372 | 41 | 49 | 27.42 | 29.82 | — .08 | 73.8 | + 2.1 | 102 | 20 | 88 | 52 | 2 | 60 | 42 | 60 | 51 | 36 | 0.12 | — 0.9 | 3 | 4,181 | n. | 27 | sw. | 22 | 18 | 10 | 3 | 3.2 | |
| Helena | 4,108 | 88 | 93 | 25.86 | 29.93 | + .03 | 69.0 | + 2.5 | 93 | 12 | 82 | 46 | 23 | 56 | 36 | 53 | 38 | 40 | 0.71 | + 0.1 | 5 | 4,809 | sw. | 27 | nw. | 21 | 18 | 9 | 4 | 3.4 | |
| Rapid City | 3,251 | 46 | 50 | 26.61 | 29.85 | — .06 | 72.8 | + 2.9 | 102 | 20 | 87 | 51 | 3 | 59 | 41 | 57 | 44 | 43 | 0.72 | — 0.6 | 6 | 5,533 | w. | 36 | n. | 27 | 10 | 17 | 4 | 4.3 | |
| Cheyenne | 6,105 | 58 | 60 | 24.11 | 29.88 | — .03 | 67.9 | + 2.9 | 91 | 21 | 83 | 42 | 2 | 53 | 40 | 52 | 39 | 45 | 0.90 | — 0.7 | 6 | 5,775 | nw. | 38 | sw. | 4 | 12 | 18 | 1 | 3.8 | |
| Lander | 5,372 | 28 | 36 | 24.72 | 29.96 | + .02 | 65.6 | + 0.6 | 92 | 3 | 82 | 45 | 6 | 49 | 45 | 53 | 42 | 52 | 0.62 | — 0.2 | 5 | 2,889 | sw. | 35 | sw. | 29 | 11 | 15 | 5 | 4.7 | |
| North Platte | 2,826 | 43 | 52 | 27.06 | 29.91 | — .04 | 73.8 | + 2.4 | 101 | 20 | 88 | 50 | 2 | 60 | 40 | 62 | 57 | 66 | 1.40 | — 1.0 | 7 | 6,025 | s. | 36 | s. | 31 | 21 | 8 | 2 | 3.1 | |
| *Middle Slope.* | | | | | | | 76.6 | + 1.9 | | | | | | | | | | 60 | 1.75 | — 0.9 | | | | | | | | | | 2.7 | |
| Denver | 5,290 | 79 | 151 | 24.81 | 29.91 | + .02 | 72.6 | + 2.5 | 95 | 4 | 87 | 50 | 1 | 58 | 37 | 56 | 44 | 45 | 0.96 | — 0.5 | 6 | 5,374 | s. | 40 | sw. | 22 | 14 | 15 | 2 | 4.0 | |
| Pueblo | 4,713 | 74 | 81 | 25.32 | 29.90 | — .02 | 74.1 | + 1.8 | 98 | 30 | 90 | 52 | 12 | 58 | 43 | 56 | 44 | 45 | 0.54 | — 1.5 | 7 | 4,899 | nw. | 38 | n. | 15 | 17 | 13 | 1 | 3.4 | |
| Concordia | 1,398 | 42 | 47 | 28.47 | 29.90 | — .08 | 79.4 | + 5.0 | 104 | 29 | 93 | 50 | 1 | 66 | 35 | 67 | 61 | 61 | 1.03 | — 1.9 | 6 | 4,999 | s. | 24 | s. | 13 | 18 | 13 | 0 | 3.5 | |
| Dodge | 2,504 | 44 | 52 | 27.40 | 29.91 | — .02 | 77.8 | + 2.6 | 100 | 16 | 91 | 58 | 2 | 65 | 32 | 65 | 59 | 62 | 2.26 | — 0.6 | 3 | 7,562 | s. | 31 | s. | 31 | 23 | 8 | 0 | 1.9 | |
| Wichita | 1,351 | 78 | 85 | 28.56 | 29.95 | + .01 | 77.3 | + 0.8 | 96 | 29 | 88 | 57 | 11 | 66 | 28 | 68 | 64 | 70 | 2.78 | — 0.8 | 4 | 4,948 | s. | 24 | n. | 18 | 24 | 4 | 3 | 2.2 | |
| Oklahoma | 1,218 | 54 | 62 | 28.71 | 29.97 | + .02 | 78.2 | — 1.2 | 97 | 19 | 88 | 59 | 12 | 68 | 27 | 70 | 67 | 76 | 2.82 | — 0.3 | 6 | 5,779 | s. | 30 | sw. | 23 | 24 | 7 | 0 | 1.3 | |
| *Southern Slope.* | | | | | | | 77.6 | + 1.0 | | | | | | | | | | 59 | 2.93 | + 0.2 | | | | | | | | | | 3.2 | |
| Abilene | 1,749 | 45 | 54 | 28.19 | 29.96 | — .01 | 81.1 | + 0.9 | 98 | 19 | 92 | 61 | 13 | 70 | 31 | 67 | 60 | 57 | 1.94 | — 0.7 | 7 | 5,387 | se. | 36 | ne. | 19 | 15 | 10 | 6 | 4.0 | |
| Amarillo | 3,691 | 54 | 61 | 26.31 | 29.96 | .00 | 74.0 | + 1.1 | 92 | 23 | 86 | 59 | 1 | 62 | 29 | 63 | 56 | 61 | 4.63 | + 1.1 | 5 | 9,319 | s. | 46 | se. | 2 | 24 | 5 | 2 | 2.5 | |
| *Southern Plateau.* | | | | | | | 91.5 | + 1.2 | | | | | | | | | | 43 | 1.27 | + 0.1 | | | | | | | | | | 3.3 | |
| El Paso | 3,767 | 10 | 110 | 26.19 | 29.89 | .00 | 78.5 | — 0.5 | 95 | 2 | 90 | 60 | 14 | 67 | 32 | 63 | 55 | 52 | 1.00 | — 0.8 | 6 | 6,443 | e. | 42 | nw. | 1 | 14 | 15 | 2 | 4.0 | |
| Santa Fe | 6,998 | 47 | 50 | 23.39 | 29.95 | — .02 | 67.8 | + 1.5 | 85 | 2 | 79 | 52 | 10 | 57 | 31 | 54 | 45 | 52 | 4.00 | + 1.4 | 12 | 4,292 | se. | 25 | s. | 22 | 9 | 18 | 4 | 4.5 | |
| Phenix | 1,076 | 47 | 57 | 28.70 | 29.78 | — .02 | 89.8 | + 1.6 | 109 | 18 | 101 | 71 | 4 | 78 | 30 | 70 | 60 | 44 | 1.03 | + 0.1 | 9 | 3,411 | nw. | 40 | e. | 20 | 15 | 12 | 4 | 4.0 | |
| Yuma | 139 | 16 | 50 | 29.60 | 29.74 | — .04 | 91.4 | + 0.7 | 113 | 18 | 103 | 74 | 18 | 80 | 39 | 74 | 67 | 51 | 0.19 | — 0.2 | 2 | 5,124 | sw. | 44 | n. | 10 | 25 | 4 | 2 | 2.6 | |
| Independence | 3,907 | 10 | 58 | 25.94 | 29.73 | — .10 | 80.1 | + 2.5 | 104 | 1 | 93 | 54 | 31 | 67 | 33 | 55 | 27 | 17 | 0.11 | — 0.1 | 3 | 5,833 | nw. | 30 | nw. | 29 | 26 | 4 | 1 | 1.4 | |
| *Middle Plateau.* | | | | | | | 73.4 | + 2.7 | | | | | | | | | | 31 | 0.54 | + 0.2 | | | | | | | | | | 3.3 | |
| Carson City | 4,720 | 82 | 92 | 25.25 | 29.86 | .00 | 70.8 | + 3.8 | 100 | 1 | 88 | 43 | 19 | 53 | 44 | 51 | 33 | 31 | 0.18 | 0.0 | 1 | 4,597 | w. | 40 | s. | 12 | 19 | 12 | 0 | 2.4 | |
| Winnemucca | 4,340 | 59 | 70 | 25.62 | 29.84 | — .02 | 72.7 | + 2.1 | 100 | 10 | 90 | 41 | 20 | 56 | 47 | 54 | 36 | 29 | 0.09 | 0.0 | 1 | 6,259 | w. | 45 | sw. | 28 | 20 | 11 | 0 | 2.5 | |
| Salt Lake City | 4,344 | 83 | 90 | 25.63 | 29.85 | — .03 | 76.8 | + 2.2 | 97 | 26 | 90 | 58 | 24 | 64 | 34 | 59 | 44 | 34 | 1.35 | + 0.6 | 4 | 4,486 | se. | 29 | nw. | 30 | 10 | 17 | 4 | 5.1 | |
| *Northern Plateau.* | | | | | | | 73.0 | + 3.7 | | | | | | | | | | 44 | 0.47 | + 0.2 | | | | | | | | | | 2.7 | |
| Baker City | 3,470 | 49 | 55 | 26.40 | 29.85 | — .09 | 70.6 | + 4.5 | 101 | 10 | 86 | 46 | 22 | 55 | 40 | 52 | 35 | 34 | 0.31 | + 0.1 | 4 | 3,785 | s. | 23 | nw. | 29 | 18 | 7 | 6 | 3.0 | |
| Idaho Falls | 4,742 | 10 | 56 | 25.25 | 29.89 | — .01 | 69.6 | + 2.0 | 95 | 11 | 88 | 41 | 23 | 51 | 48 | 55 | 44 | 48 | 0.34 | — 0.1 | 3 | 6,529 | n. | 42 | n. | 5 | 23 | 3 | 5 | 2.8 | |
| Spokane | 1,943 | 99 | 107 | 27.87 | 29.84 | — .07 | 73.2 | + 4.2 | 104 | 8 | 88 | 49 | 31 | 58 | 44 | 57 | 44 | 44 | 1.00 | + 0.7 | 4 | 3,435 | s. | 31 | sw. | 29 | 22 | 4 | 5 | 2.3 | |
| Walla Walla | 1,018 | 65 | 73 | 28.80 | 29.84 | — .08 | 78.4 | + 4.2 | 113 | 10 | 92 | 55 | 31 | 65 | 41 | 64 | 56 | 52 | 0.22 | 0.0 | 3 | 3,909 | s. | 16 | s. | 30 | 24 | 6 | 1 | 2.6 | |
| *N. Pac. Coast Reg.* | | | | | | | 63.3 | + 1.9 | | | | | | | | | | 77 | 0.37 | — 0.6 | | | | | | | | | | 4.8 | |
| Fort Canby | 179 | 10 | 34 | 29.78 | 29.97 | — .07 | 60.6 | + 1.5 | 87 | 23 | 65 | 52 | 15 | 56 | 29 | 58 | 56 | 90 | 0.62 | — 0.4 | 11 | 6,245 | n. | 32 | s. | 19 | 5 | 5 | 21 | 7.5 | |
| Neah | 40 | .... | .... | 29.91 | 29.96 | — .06 | 58.0 | — 1.0 | 75 | 1 | 64 | 48 | 31 | 52 | 24 | 55 | 54 | 89 | 0.15 | — 2.6 | 4 | 5,516 | w. | 28 | w. | 10 | 8 | 9 | 14 | 5.9 | |
| Port Angeles | 29 | 47 | 62 | ..... | ..... | ..... | 58.4 | + 1.7 | 82 | 10 | 65 | 46 | 29 | 52 | 31 | .... | .... | .... | 0.17 | — 0.5 | 2 | 4,583 | nw. | 22 | nw. | 10 | 17 | 10 | 4 | 3.3 | |
| Pysht | .... | 5 | .... | .... | .... | ..... | 61.2 | + 2.8 | 85 | 5 | 71 | 43 | 24 | 51 | 35 | ... | .... | .... | 0.51 | — 0.5 | 3 | ..... | w. | ... | ..... | ... | 23 | 1 | 6 | .... | |
| Seattle | 119 | 114 | 121 | 29.82 | 29.95 | — .07 | 66.3 | + 3.1 | 92 | 1 | 75 | 54 | 29 | 57 | 32 | 59 | 55 | 72 | 0.15 | — 0.4 | 3 | 2,888 | w. | 14 | se. | 30 | 16 | 6 | 9 | 3.8 | |
| Tacoma | 213 | 113 | 120 | ..... | ..... | .. .. | 65.6 | + 4.0 | 92 | 1 | 75 | 52 | 13 | 56 | 32 | .. | .... | .... | 0.38 | — 0.4 | 3 | 3,190 | n. | 18 | w. | 10 | 16 | 6 | 9 | 4.3 | |
| Astoria | ..... | 18 | .... | ..... | ..... | ..... | 63.0 | + 0.8 | 84 | 23 | 69 | 51 | 9 | 57 | 28 | .... | .... | .... | 0.30 | — 0.7 | 3 | ..... | sw. | ... | ..... | ... | 8 | 6 | 17 | .... | |
| Portland, Oreg | 153 | 208 | 213 | 29.77 | 29.93 | — .09 | 68.2 | + 2.3 | 97 | 5 | 78 | 52 | 28 | 58 | 33 | 60 | 56 | 69 | 0.15 | — 0.4 | 2 | 5,171 | nw. | 29 | sw. | 30 | 14 | 10 | 7 | 4.4 | |
| Roseburg | 521 | 56 | 67 | 29.36 | 29.91 | — .11 | 68.4 | + 2.2 | 99 | 1 | 82 | 48 | 22 | 55 | 42 | 59 | 53 | 65 | 0.89 | + 0.7 | 2 | 2,517 | nw. | 15 | nw. | 10 | 14 | 9 | 8 | 4.1 | |
| *Mid. Pac. C'st Reg.* | | | | | | | 64.4 | — 0.4 | | | | | | | | | | 65 | 0.01 | 0.0 | | | | | | | | | | 3.8 | |
| Eureka | 64 | 60 | 69 | 29.92 | 29.98 | — .04 | 55.9 | — 0.6 | 64 | 27 | 60 | 49 | 13 | 52 | 11 | 54 | 52 | 90 | 0.06 | 0.0 | 1 | 3,695 | nw. | 28 | nw. | 30 | 5 | 12 | 14 | 6.6 | |
| Red Bluff | 334 | 54 | 58 | 29.47 | 29.81 | — .04 | 81.3 | + 0.2 | 111 | 11 | 96 | 56 | 3 | 66 | 39 | 61 | 45 | 32 | T. | 0.0 | 0 | 3,410 | se. | 20 | se. | 14 | 27 | 3 | 1 | 1.6 | |
| Sacramento | 71 | 106 | 117 | 29.75 | 29.82 | — .05 | 73.8 | + 1.1 | 110 | 11 | 90 | 52 | 8 | 58 | 42 | 59 | 49 | 50 | 0.00 | 0.0 | 0 | 7,064 | sw. | 24 | sw. | 29 | 25 | 6 | 0 | 2.0 | |
| San Francisco | 153 | 161 | 167 | 29.76 | 29.92 | — .02 | 57.0 | — 1.7 | 72 | 9 | 62 | 47 | 22 | 52 | 22 | 54 | 53 | 88 | T. | 0.0 | 0 | 10,873 | sw. | 38 | w. | 12 | 10 | 17 | 4 | 5.0 | |
| Point Reyes Light | ..... | 12 | .... | ..... | ..... | ..... | 53.9 | — 1.0 | 71 | 13 | 58 | 47 | 22 | 49 | 23 | .... | .... | .... | T. | — 0.2 | 0 | ..... | nw. | ... | ..... | ... | 5 | 9 | 17 | .... | |
| *S. Pac. Coast Reg.* | | | | | | | 72.9 | + 1.5 | | | | | | | | | | 64 | T. | 0.0 | | | | | | | | | | 2.5 | |
| Fresno | 332 | 67 | 70 | 29.43 | 29.77 | — .07 | 81.6 | — 0.1 | 113 | 11 | 99 | 55 | 30 | 64 | 43 | 59 | 41 | 30 | 0.00 | 0.0 | 0 | 4,548 | nw | 17 | nw. | 10 | 25 | 6 | 0 | 1.4 | |
| Los Angeles | 330 | 74 | 82 | 29.51 | 29.86 | — .05 | 73.9 | + 3.5 | 96 | 12 | 86 | 56 | 8 | 62 | 34 | 63 | 59 | 71 | T. | 0.0 | 0 | 3,088 | sw | 13 | sw. | 5 | 12 | 19 | 0 | 3.1 | |
| San Diego | 87 | 94 | 102 | 29.75 | 29.85 | — .07 | 70.6 | + 1.7 | 83 | 20 | 75 | 63 | 6 | 66 | 15 | 66 | 64 | 83 | 0.00 | — 0.1 | 0 | 3,857 | nw. | 18 | nw. | 24 | 26 | 4 | 1 | 2.3 | |
| San Luis Obispo | 201 | 10 | 46 | 29.70 | 29.92 | — .01 | 65.6 | + 0.8 | 97 | 12 | 80 | 46 | 1 9 | 52 | 42 | 56 | 52 | 70 | 0.00 | 0.0 | 0 | 2,942 | w. | 13 | w. | 3 | 19 | 12 | 0 | 3.2 | |

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. * Two or more dates. † Received too late to be considered in departures, etc.

Partial reports for August, 1898, were received from the following stations recently established in the West Indies: Basseterre, St. Kitts Island; Bridgetown, Barbados; Willemstad, Curaçao: Santiago de Cuba, Cuba; Santo Domingo, Santo Domingo; also a report of the temperature at 7 a. m., 2 and 9 p. m., maximum and minimum from Guayama, Puerto Rico, from August 19 to 31, inclusive, by Lieut. Col. W. . . Glassford, Signal Corps, U. S. A. Reports from the above stations, with others that have been established, will be published as a part of this table in future.

TABLE II.—*Meteorological record of voluntary and other cooperating observers, August, 1898.*

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *Alabama.* | ° | ° | ° | *Ins.* | *Ins.* |
| Alco† | 93 | 65 | 77.6 | 17.48 | |
| Ashville † | 95 | 64 | 77.8 | 3.50 | |
| Bermuda† | 92 | 69 | 79.0 | 14.21 | |
| Birmingham† | 98 | 68 | 80.0 | 8.57 | |
| Bridgeport† | | | | 2.04 | |
| Citronelle† | 91 | 71 | 78.8 | 8.89 | |
| Clanton† | 91 | 62 | 77.1 | 3.34 | |
| Daphne | 98 | 68 | 81.4 | 14.52 | |
| Decatur† | 98 | 62 | 78.6 | 3.17 | |
| Demopolis | | | | 7.25 | |
| Elba | 93 | 66 | 77.8 | 10.90 | |
| Eufaula *a*† | 96 | 65 | 79.2 | 11.99 | |
| Evergreen | 99 | 67 | 79.0 | 13.52 | |
| Florence *a*† | | | | 4.03 | |
| Florence *b*† | 95 | 59 | 79.2 | 4.34 | |
| Fort Deposit | 94 | 60 | 76.6 | 10.22 | |
| Gadsden | 96 | 64 | 77.4 | 3.97 | |
| Goodwater | 97 | 64 | 78.8 | 9.02 | |
| Greensboro† | 93 | 69 | 79.1 | 5.06 | |
| Hamilton | 99 | 61 | 79.2 | 2.95 | |
| Healing Springs | 94 | 66 | 78.7 | 11.30 | |
| Highland Home† | 91 | 69 | 77.4 | 9.81 | |
| Livingston | 95 | 68 | 80.8 | 3.82 | |
| Lock No. 4 | 93 | 65 | 78.3 | | |
| Madison Station† | 94 | 61 | 76.6 | 4.75 | |
| Maplegrove | 94 | 65 | 78.0 | 4.77 | |
| Marion† | 95 | 68 | 80.2 | 12.20 | |
| Mount Willing† | 98 | 70 | 80.4 | 7.57 | |
| Newbern† | 94 | 67 | 79.7 | 5.79 | |
| Newburg | 95 | 62 | 78.6 | 4.05 | |
| Newton† | 94 | 64 | 74.8 | | |
| Oneonta | 91 | 64 | 75.5 | 5.25 | |
| Opelika† | 95 | 64 | 78.3 | 9.30 | |
| Oxanna† | 90 | 63 | 74.8 | 8.15 | |
| Pineapple | 102 | 67 | 80.8 | 5.87 | |
| Pushmataha† | 96 | 69 | 80.1 | 8.20 | |
| Riverton† | 98 | 69 | 80.0 | 1.02 | |
| Rockmills | 93 | 65 | 77.4 | | |
| Scottsboro† | 92 | 62 | 77.6 | 3.53 | |
| Selma † | 97 | 65 | 81.3 | 6.42 | |
| Sturdevant | | | | 8.80 | |
| Talladega | 92 | 66 | 78.4 | 7.65 | |
| Tallassee | | | | 7.40[e] | |
| Thomasville | 100 | 65 | 80.7 | 1.89 | |
| Tuscaloosa† | 97 | 69 | 80.4 | 4.77 | |
| Tuscumbia | 97 | 65 | 80.0 | 7.90 | |
| Union† | 96 | 69 | 80.6 | 8.29 | |
| Union Springs† | 93 | 61 | 79.0 | 9.27 | |
| Uniontown† | 96 | 72 | 81.3 | 6.28 | |
| Valleyhead | 94 | 60 | 77.2 | 6.94 | |
| Warrior | | | | 6.92 | |
| Wetumpka | 94 | 71 | 80.0 | 8.52 | |
| Wilsonville† | | | | 5.04 | |
| *Arizona.* | | | | | |
| Benson *o*1 | 99 | 67 | 81.4 | 3.91 | |
| Bisbee† | 91 | 61 | 73.8 | 3.84 | |
| Buckeye† | 108 | 72 | 88.8 | 1.70 | |
| Calabasas | 102 | 61 | 79.0 | 8.51 | |
| Camp Creek | 101 | 66 | 83.4 | 2.95 | |
| Casa Grande *o*1 | 109 | 70 | 91.1 | 1.25 | |
| Champie Camp | 111 | 66 | 88.6 | 3.20 | |
| Congress | 104 | 63 | 84.2 | 2.92 | |
| Dragoon | | | | 2.55 | |
| Dragoon Summit *o*1 | 98 | 57 | 70.8 | 2.38 | |
| Dudleyville | 104 | 62 | 82.8 | 2.23 | |
| Empire Ranch | | 60 | | 8.36 | |
| Flagstaff † | 94 | 48 | 69.5 | 2.69 | |
| Fort Apache | 98 | 55 | 75.1 | 3.59 | |
| Fort Defiance | 90 | 41 | 69.8 | 2.53 | |
| Fort Grant† | 94 | 61 | 76.0 | 4.41 | |
| Fort Huachuca† | 94 | 53 | 73.7 | 6.22 | |
| Fort Mohave | 124 | | | T. | |
| Gilabend *a*o1 | 115 | 78 | 91.8 | 0.60 | |
| Holbrook† | 103 | 54 | 78.7 | 1.96 | |
| Hot Springs | 105 | 68 | 86.0 | 4.31 | |
| Jerome | 99 | 59 | 77.6 | 3.80 | |
| Lochiel *o*1 | 90 | 62 | 72.8 | 4.56 | |
| Maricopa *o*1 | 112 | 76 | 92.3 | 1.01 | |
| Mesa † | 110 | 69 | 89.3 | 1.10 | |
| Mount Huachuca | 93 | 59 | 72.6 | 3.94 | |
| Music Mountain | 110 | 62 | 86.2 | 3.01 | |
| Natural Bridge | | | | 3.50 | |
| Oracle | 98 | 59 | 78.6 | 4.97 | |
| Oro | | | | 2.15 | |
| Oro Blanco | 98 | 62 | 78.8 | 5.76 | |
| Pantano *o*1 | 96 | 70 | 79.9 | 4.41 | |
| Parker *b* | 123 | 78 | 94.3 | 0.26 | |
| Peoria † | 110 | 70 | 90.6 | 2.23 | |
| Phenix | 106 | 69 | 87.2 | 1.00 | |
| Pima | | | | 1.93 | |
| Pinal Ranch | | | | 3.53 | |
| Prescott | 98 | | | 3.53 | |
| San Carlos † | 110 | 63 | 86.0 | 1.41 | |
| San Simon *o*1 | 100 | 65 | 80.2 | 0.24 | |
| Showlow | | | | 4.40 | |
| Signal† | 110 | 68 | 89.9 | 3.94 | |

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *Arizona*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| Snowflake | 94 | 53 | 72.6 | 3.25 | |
| Strawberry | 91 | 51 | 70.1 | 3.82 | |
| Sulphur Spring Valley | | | | 2.97 | |
| Texas Hill *o*1 | 118 | 75 | 96.5 | 1.47 | |
| Tombstone | 95 | 61 | 75.7 | 3.68 | |
| Tucson† | 106 | 66 | 84.8 | 3.94 | |
| Walnut Grove | | | | 2.33 | |
| White Hills | 109 | 70[c] | 90.4 | 1.77 | |
| Willcox *o*1 | 89 | 70 | 78.4 | 1.55 | |
| *Arkansas.* | | | | | |
| Amity | 94 | 62 | 78.4 | 3.91 | |
| Arkansas City† | | | | 3.58 | |
| Beebranch | 98[d] | 59[d] | 78.2[d] | 4.40 | |
| Blanchard Springs† | 97 | 61 | 79.6 | 3.72 | |
| Brinkley | 96[e] | 63[e] | 79.4[e] | 2.45 | |
| Camden *a*† | | | | 2.55 | |
| Camden *b*† | 97 | 60 | 81.1 | 2.78 | |
| Canton *o*1 | 98 | 60 | 78.9 | | |
| Conway | 108 | 61 | 82.2 | 1.86 | |
| Corning | 98 | 57 | 78.2 | 4.67 | |
| Dallas | 96 | 61 | 78.2 | 6.36 | |
| Dardanelle | | | | 3.08 | |
| Elon† | 97 | 62 | 80.4 | 4.78 | |
| Fayetteville† | 95 | 55 | 76.2 | 4.48 | |
| Forrest | 96 | 61 | 79.9 | 3.61 | |
| Fulton† | | | | 8.89 | |
| Hardy | 97 | 60 | 78.2 | 3.09 | |
| Helena *a*† | | | | 3.50 | |
| Helena *b* | 100 | 65 | 82.4 | 3.74 | |
| Hot Springs *a* | 99 | 64 | 81.2 | 3.45 | |
| Hot Springs *b* | | | | 3.31 | |
| Jonesboro | 93 | 60 | 77.0 | 8.42 | |
| Keesees Ferry† | 96 | 57 | 77.6 | 6.03 | |
| Lacrosse† | 98 | 60 | 78.0 | 5.14 | |
| Lonoke *o*1 | 102 | 66 | 80.6 | 2.75 | |
| Lutherville *o*1 | 92 | 69 | 79.6 | | |
| Malvern† | 100 | 62 | 80.7 | 2.49 | |
| Marianna *o*1 | 98 | 70 | 81.6 | | |
| Marvell | 99 | 64 | 80.7 | 2.77 | |
| Mena *o*1 | 96 | 63 | 78.0 | 6.12 | |
| Monticello | 100 | 62 | 82.7 | 6.32 | |
| Moore | | | | 5.12 | |
| Mossville | 90 | 59 | 75.0 | 4.99 | |
| Mount Nebo | 88 | 61 | 76.2 | 4.29 | |
| New Gascony | 96 | 61 | 80.4 | 2.14 | |
| Newport *a*† | | | | 5.54 | |
| Newport *b* | 98 | 61 | 79.6 | 4.97 | |
| Newport *c*† | 97 | 60 | 79.2 | 6.74 | |
| Oregon *o*1 | 94 | 54 | 73.3 | | |
| Osceola | 96 | 61 | 78.9 | 5.18 | |
| Ozark † | 97 | 65 | 80.8 | 7.76 | |
| Picayune† | 100 | 59 | 80.3 | 3.20 | |
| Pinebluff † | 100 | 66 | 82.7 | 3.41 | |
| Pocahontas | 92 | 60 | 76.9 | 5.02 | |
| Pond | 91 | 58 | 75.4 | 2.89 | |
| Prescott | 100 | 64 | 82.0 | 3.14 | |
| Rison | 99 | 62 | 80.3 | 3.51 | |
| Russellville | 98 | 65 | 80.2 | 4.20 | |
| Silver Springs † | 94 | 58 | 76.0 | 4.97 | |
| Spielerville | 98 | 62 | 79.8 | 4.30 | |
| Stamps | 102 | | | 2.66 | |
| Stuttgart† | 97 | 62 | 79.9 | 3.41 | |
| Texarkana† | 100 | 62 | 82.0 | 5.49 | |
| Warren † | 100 | 63 | 81.2 | 3.82 | |
| Washington *o*†1 | 97 | 69 | 80.8 | 3.43 | |
| Wiggs *o*1 | 98 | 65 | 80.4 | 5.40 | |
| Witts Springs† | 92 | 59 | 75.0 | 4.94 | |
| *California.* | | | | | |
| Agnew | 90 | 42 | 64.4 | 0.00 | |
| Arlington Heights | 111 | 51 | 79.6 | 0.00 | |
| Azusa | | | | T. | |
| Ballast Point L. H | | | | 0.00 | |
| Bear Valley | | | | T. | |
| Berkeley | 78 | 51 | 61.7 | 0.04 | |
| Blue Lakes City | 117 | 44 | 76.3 | 0.00 | |
| Boca *o*1 | 96 | 28 | 63.1 | 0.00 | |
| Bodie† | 88 | 23 | 57.4 | 0.00 | |
| Bowmans Dam *o*1 | 90 | 53 | 66.1 | 0.00 | |
| Caliente *o*1 | 105 | 63 | 81.9 | 0.00 | |
| Campbell | 90 | 42 | 61.7 | 0.00 | |
| Cape Mendocino L. H | | | | 0.00 | |
| Cedarville† | 100 | 43 | 71.2 | 0.05 | |
| Centerville *o*1 | 102 | 54 | 68.3 | 0.00 | |
| Chico *o*1 | 112 | 64 | 85.3 | 0.00 | |
| Chino *o*6 | 107 | 56 | 80.1 | 0.00 | |
| Cisco *o*1 | 84 | 39 | 59.5 | | |
| Claremont† | 102 | 48 | 76.8 | 0.00 | |
| Corning *o*1 | 110 | 65 | 80.0 | 0.00 | |
| Coronado | 82 | 69 | 73.6 | 0.00 | |
| Craftonville | 112 | 52 | 84.0 | 0.00 | |
| Crescent City† | 68 | 45 | 57.2 | 0.36 | |
| Crescent City L. H | | | | 0.34 | |
| Delano *o*1 | 114 | 66 | 87.4 | 0.00 | |
| Delta *o*1 | 100 | 58 | 75.8 | 0.00 | |
| Descanso | | | | 0.83 | |
| Drytown | 114 | 45 | 75.3 | T. | |

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *California*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| Dunnigan *o*1 | 114 | 60 | 78.9 | 0.00 | |
| Durham *o*1 | 110 | 57 | 81.6 | 0.00 | |
| East Brother L. H | | | | 0.00 | |
| Edmanton *o*1 | 96 | 43 | 66.8 | T. | |
| Elsinore | 115 | 51 | 82.2 | 0.00 | |
| Escondido | 110 | 50 | 74.6 | 0.00 | |
| Fallbrook *o*1 | 105 | 60 | 73.9 | T. | |
| Folsom City *o*1 | 110 | 60 | 77.5 | T. | |
| Fordyce Dam | | | | 0.31 | |
| Fort Bragg | | | | 0.00 | |
| Fort Romie | 99 | 42 | 65.7 | 0.00 | |
| Fort Ross | 75 | 45 | 57.4 | 0.00 | |
| Glendora | | | | 0.00 | |
| Goshen *o*1 | 109 | 57 | 85.2 | 0.00 | |
| Grand Island *o*5 | 112 | 55 | 62.5 | 0.00 | |
| Grass Valley | | | | T. | |
| Greenville† | 103 | 29 | 66.0 | T. | |
| Healdsburg *o*1 | 110 | 40 | 65.0 | 0.00 | |
| Hill Ranch | 116 | 45 | 77.2 | 0.00 | |
| Hollister | 103 | 43 | 65.8 | 0.00 | |
| Hueneme (near)* | 84 | 50 | 66.6 | 0.00 | |
| Humboldt L. H | | | | 0.00 | |
| Hydesville | 72 | 44 | 58.2 | 0.11 | |
| Indio *o*1 | 113 | 78 | 93.1 | 0.30 | |
| Iowa Hill *o*1 | 100 | 58 | 74.4 | 0 00 | |
| Jackson | 106 | 52 | 77.2 | 0.00 | |
| Jolon | | | | 0.00 | |
| Keene *o*1 | 105 | 53 | 72.9 | 0.00 | |
| Kennedy Gold Mine | 108 | 49 | 75.4 | 0.00 | |
| Kernville | | | | 0.00 | |
| King City *o*1 | 104 | 48 | 65.2 | 0.00 | |
| Kingsburg *o*1 | 108 | 62 | 86.2 | 0.00 | |
| Lagrange *o*5 | 116 | 55 | 84.8 | 0.00 | |
| Laporte *o*†1 | 90 | 43 | 62.6 | 0.04 | |
| Las Fuentes Ranch | | | | 0.00 | |
| Lemoore *a*o1 | 110 | 59 | 83.2 | 0.00 | |
| Lick Observatory | 91 | 52 | 71.2 | 0.00 | |
| Limekiln | 112 | 54 | 82.0 | 0.00 | |
| Lime Point L. H | | | | 0.06 | |
| Lodi | 108 | 52 | 74.4 | 0.00 | |
| Los Gatos *b* | 97 | 48 | 67.2 | 0.00 | |
| Lytton Springs | 104 | 49 | 70.1 | 0.00 | |
| Malakoff Mine | 99 | 47 | 72.8 | T. | |
| Mammoth Tank *o*1 | 118 | 90 | 101.6 | 0.00 | |
| Manzana | 112 | 58 | 84.6 | 0.00 | |
| Mare Island L. H | | | | 0.00 | |
| Merced *o*1 | 112 | 62 | 80.9 | 0.00 | |
| Mills College | | | | 0.03 | |
| Milo | | | | 0.00 | |
| Milton (near) *o*1 | 110 | 55 | 76.2 | 0.00 | |
| Modesto *o*1 | 108 | 61 | 79.9 | 0.00 | |
| Mohave *o*1 | 110 | 65 | 88.0 | 0.00 | |
| Mokelumne Hill *o*3 | | 53 | 74.2 | 0.00 | |
| Monterey *o*1 | 82 | 50 | 62.7 | 0.00 | |
| Mount Frazier | | | | 0.00 | |
| Napa *b* | 104 | 46 | 67.9 | 0.00 | |
| Needles | 112 | 76 | 93.9 | 0.29 | |
| Nevada City | 96 | 43 | 69.5 | T. | |
| Newhall *o*1 | 112 | 55 | 79.6 | 0.00 | |
| North Ontario | 100 | 54 | 76.7 | 0.00 | |
| North San Juan *o*5 | 102 | 52 | 71.0 | T. | |
| Oakland *a* | 82 | 49 | 61.6 | T. | |
| Ogilby *o*1 | 115 | 85 | 100.2 | 0.00 | |
| Oleta *o*1 | 105 | 53 | 71.8 | 0.00 | |
| Orland *o*1 | 118 | 62 | 84.6 | 0.00 | |
| Palermo | 115 | 50 | 79.7 | 0.00 | |
| Paso Robles *b* | 112 | 34 | 66.6 | 0.00 | |
| Peachland *o*5 | 94 | 47 | 66.0 | T. | |
| Piedras Blancas L. H | | | | 0.00 | |
| Pigeon Point L. H | | | | 0.00 | |
| Pilot Creek | | | | T. | |
| Pine Crest | 97 | 52 | 71.8 | 0.00 | |
| Placerville | 102 | 44 | 70.9 | T. | |
| Point Ano Nuevo L. H | | | | 0.00 | |
| Point Arena L. H | | | | 0.00 | |
| Point Bonita L. H | | | | 0.28 | |
| Point Conception L. H | | | | 0.00 | |
| Point Firmin L. H | | | | 0.00 | |
| Point Hueneme L. H | | | | 0.00 | |
| Point Lobos | 66 | 48 | 56.4 | 0.02 | |
| Point Loma L. H | | | | 0.00 | |
| Point Montara L. H | | | | 0.00 | |
| Point Pinos L. H | | | | 0.00 | |
| Point Reyes L. H | | | | 0.00 | |
| Point Sur L. H | | | | 0.00 | |
| Pomona (near) | 108 | 48 | 78.4 | T. | |
| Poway *o*3 | 98 | 63 | 75.7 | T. | |
| Quincy † | 98 | 32 | 66.6 | T. | |
| Redding *b*† | 106 | 57 | 80.6 | T. | |
| Redlands | 112 | 52 | 81.1 | T. | |
| Represa | 104 | 54 | 76.1 | 0.00 | |
| Rio Vista | 108 | 53 | 73.6 | 0.00 | |
| Roe Island L. H | | | | 0.00 | |
| Rosewood | 113 | 47 | 78.2 | 0.01 | |
| Sacramento *a* | 107 | 51 | 73.5 | 0.00 | |
| Salinas *o*1 | 75 | 52 | 64.0 | 0.00 | |

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *California*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| Salton *[1] | 121 | 80 | 98.4 | T. | |
| San Bernardino† | 108 | 47 | 78.6 | 0.00 | |
| San Jacinto | 109 | 49 | 80.4 | 0.54 | |
| San Leandro *[1] | 86 | 58 | 64.6 | 0.00 | |
| San Luis L. H | | | | 0.00 | |
| San Mateo *[1] | 83 | 57 | 71.8 | 0.00 | |
| San Miguel *[1] | 107 | 55 | 72.4 | 0.00 | |
| Santa Barbara *a* | 90 | 56 | 68.6 | 0.00 | |
| Santa Barbara L. H | | | | 0.00 | |
| Santa Clara *a* | | | | 0.00 | |
| Santa Cruz *b*† | 94 | 42 | 63.5 | 0.00 | |
| Santa Cruz L. H | | | | 0.00 | |
| Santa Maria | 95 | 49 | 66.4 | 0.00 | |
| Santa Monica *[1] | 84 | 60 | 72.0 | 0.00 | |
| Santa Paula | 94 | 48 | 68.9 | 0.00 | |
| Santa Rosa *[1] | 97 | 47 | 62.3 | 0.00 | |
| Saticoy | | | | 0.00 | |
| Shasta | 114 | 53 | 82.6 | T. | |
| Sierra Madre | 99 | 51 | 75.7 | 0.00 | |
| Sneddens Ranch *[1] | 92 | 24 | 58.0 | 0.00 | |
| Sonoma | | | | 0.00 | |
| S. E. Farallone L. H | | | | 0.00 | |
| Stanford University | 91 | 48 | 65.2 | 0.00 | |
| Stockton *a* | 105 | 40 | 71.4 | 0.00 | |
| Summerdale† | 92 | 46 | 70.0 | 0.00 | |
| Susanville† | 96 | 43 | 70.0 | 0.08 | |
| Sutter Creek *[5] | 102 | 43 | 70.4 | 0.00 | |
| Tehama *[1] | 110 | 64 | 82.8 | T. | |
| Templeton *[1] | 116 | 56 | 72.0 | 0.00 | |
| Trinidad L. H | | | | 0.00 | |
| Truckee *[1] | 96 | 50 | 73.2 | 0.00 | |
| Tulare *b* | | | | 0.00 | |
| Tulare *c* | 112 | 50 | 82.2 | 0.00 | |
| Turlock | 109 | 62 | 86.5 | 0.00 | |
| Ukiah | 103 | 45 | 70.4 | T. | |
| Upperlake | 109 | 44 | 75.8 | T. | |
| Upper Mattole *[1] | 90 | 52 | 64.5 | 0.00 | |
| Vacaville *a* *[1] | 113 | 58 | 75.5 | 0.00 | |
| Ventura† | 89 | 44 | 63.8 | 0.00 | |
| Visalia | 107 | 64 | 82.6 | 0.00 | |
| Volcano Springs *[1] | 124 | 80 | 100.2 | | |
| Walnut Creek | 109 | 55 | 73.8 | 0.00 | |
| West Palmdale | | | | T. | |
| Wheatland | 114 | 54 | 76.8 | 0.00 | |
| Williams *[1] | 113 | 60 | 82.0 | 0.00 | |
| Wilmington *[5] | 97 | 60 | 72.3 | 0.00 | |
| Wire Bridge *[5] | 108 | 53 | 78.8 | 0.00 | |
| Yerba Buena L. H | | | | 0.00 | |
| Yreka† | 104 | 40 | 72.0 | 0.05 | |
| *Colorado.* | | | | | |
| Altman | 83 | 35 | 58.4 | 2.20 | |
| Antlers† | 96 | 50 | 73.2 | 1.12 | |
| Arkins | | | | 1.61 | |
| Boulder | 93 | 52 | 73.0 | 1.52 | |
| Boxelder | | | | 1.71 | |
| Breckenridge† | 83 | 29 | 52.3 | 1.59 | |
| Canyon† | 99 | 52 | 75.5 | 0.80 | |
| Castlerock | 90 | 43 | 67.8 | 1.49 | |
| Cedaredge | 93 | 44 | 70.6 | 0.62 | |
| Cheyenne Wells | 98 | 52 | 73.8 | 1.33 | |
| Colbran | | | | 1.96 | |
| Colorado Springs† | 89 | 46 | 68.0 | 0.56 | |
| Cope | 98 | 50 | 74.0 | 1.75 | |
| Crook | 105 | 45 | 75.5 | 0.14 | |
| Delta | 107 | 47 | 74.0 | 0.51 | |
| Dumont† | | | | 2.60 | |
| Durango | 91 | 43 | 69.0 | 0.89 | |
| Fort Collins† | 96 | 43 | 69.9 | 0.98 | |
| Fort Morgan | 101 | 42 | 73.2 | 0.33 | |
| Fox | | | | 1.10 | |
| Garnett | 85 | 31 | 59.9 | 0.32 | |
| Georgetown | 80 | 44 | 62.4 | | |
| Gleneyrie† | 85 | 45 | 66.2 | 1.44 | |
| Grand Junction† | 96 | 56 | 77.6 | 0.57 | |
| Greeley | 98 | 46 | 71.2 | 0.83 | |
| Gunnison | 87 | 34 | 62.6 | 0.68 | |
| Hamps | 91 | 47 | 67.4 | 1.61 | |
| Hoehne | 92 | 48 | 69.6 | 1.59 | |
| Holly | | | | 1.36 | |
| Holyoke | | | | 1.27 | |
| Holyoke (near) | | | | 2.07 | |
| Husted† | 97 | 41 | 68.0 | 1.37 | |
| Lake Moraine | 74 | 31 | 54.0 | 2.37 | |
| Lamar† | 105[c] | 50 | 76.6 | 0.91 | |
| Laporte | | | | 1.72 | |
| Las Animas† | 99 | 47 | 71.9 | 2.40 | |
| Leadville (near) *†[1] | 75 | 42 | 57.0 | 1.49 | |
| Leroy† | 100 | 51 | 74.0 | 1.13 | |
| Longs Peak | 81 | 33 | 56.6 | 1.53 | |
| Loveland | | | | 1.32 | |
| Meeker | 94 | 39 | 67.6 | 2.14 | |
| Minneapolis† | 100[j] | 52[j] | 75.0[j] | 1.35 | |
| Moraine† | 85 | 36 | 61.5 | 1.67 | |
| Pagoda† | 96 | 35 | 67.3 | 1.68 | |
| Paonia | | | | 0.44 | |
| Parachute | 101 | 53 | 77.3 | 1.09 | |

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *Colorado*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| Rangely† | 98 | 45 | 72.4 | 1.28 | |
| Redcliff | | | | 2.80 | |
| Rockyford | 100 | 52 | 74.4 | 0.92 | |
| Ruby | | | | 0.26 | |
| Saguache† | 83 | 42 | 62.2 | 1.05 | |
| Salida | 94 | 40 | 66.9 | 0.86 | |
| San Luis† | 83 | 38 | 61.0 | 1.06 | |
| Santa Clara *[1] | 85 | 42 | 60.2 | 2.37 | |
| Seguro | 78 | 30 | 56.2 | 3.14 | |
| Seibert† | | | | 1.03 | |
| Smoky Hill Mine | 88 | 39 | 63.4 | 2.78 | |
| Springfield | | | | 2.12 | |
| Stamford *[1] | 78 | 38 | 50.8 | 3.03 | |
| Strickler Tunnel | | | | 2.48 | |
| Trinidad | | | | 1.02 | |
| T. S. Ranch† | 93 | 55 | 72.8 | 1.29 | |
| Wagon Wheel | 75 | 29 | 52.8 | 1.35 | |
| Walden | 88 | 33 | 62.4 | 0.53 | |
| Wallet | | | | 1.30 | |
| Wray† | 98 | 50 | 74.1 | 2.56 | |
| Yuma | | | | 3.62 | |
| *Connecticut.* | | | | | |
| Canton† | 89 | 44 | 69.3 | 7.02 | |
| Colchester | 88 | 47 | 71.2 | 8.65 | |
| Falls Village | | | | 8.22 | |
| Greenfield Hill | | | | 7.03 | |
| Hartford *a* | 88 | 52 | 72.2 | 7.48 | |
| Hartford *b* | | | | 6.88 | |
| Hawleyville | 91 | 46 | 71.1 | 8.47 | |
| Lake Konomoc | | | | 7.92 | |
| Middletown | 92 | 50 | 74.2 | 7.92 | |
| New London† | 87 | 52 | 71.2 | 7.69 | |
| North Grosvenor | | | | 5.20 | |
| Norwalk | 88 | 50 | 71.0 | 7.15 | |
| Pomfret | 88[d] | 49[d] | 71.3[d] | 5.60 | |
| Southington | 88 | 48 | 71.0 | 8.50 | |
| South Manchester | | | | 6.68 | |
| Storrs | 88 | 47 | 70.0 | 5.87 | |
| Voluntown† | 87 | 43 | 71.0 | 7.28 | |
| Wallingford | | | | 7.93 | |
| Waterbury | 92 | 46 | 71.6 | 9.48 | |
| West Cornwall† | 85 | 49 | 68.6 | 6.77 | |
| West Simsbury | | | | 7.38 | |
| Winsted *[1] | 90 | 52 | 68.9 | | |
| *Delaware.* | | | | | |
| Dover | 93 | 59 | 76.0 | 4.11 | |
| Milford | 95 | 62 | 79.3 | 4.77 | |
| Millsboro | 94 | 59 | 77.3 | 5.25 | |
| Newark | 91 | 53 | 74.8 | 7.02 | |
| Seaford | 92 | 55 | 76.2 | 4.19 | |
| *District of Columbia.* | | | | | |
| Distributing Reservoir *[5] | 90 | 60 | 77.2 | 8.97 | |
| Receiving Reservoir *[5] | 90 | 61 | 77.3 | 10.61 | |
| West Washington | 94 | 56 | 77.0 | 9.13 | |
| *Florida.* | | | | | |
| Archer† | 94 | 69 | 81.2 | 9.49 | |
| Bartow | 91 | 70 | 80.3 | 8.89 | |
| Brooksville† | 92 | 69 | 79.4 | 13.44 | |
| Carrabelle† | 91 | 73 | 81.0 | 19.90 | |
| Clermont | 97 | 68 | 82.2 | 13.48 | |
| Crawfordville | | | | 20.56 | |
| De Funiak Springs | 95 | 66 | 78.2 | 22.98 | |
| Earnestville | 95 | 70 | 81.6 | 20.16 | |
| Estero *[1] | 90 | 69 | 79.6 | | |
| Eustis† | 96 | 67 | 81.8 | 10.95 | |
| Federal Point† | 92 | 68 | 80.6 | 10.59 | |
| Fort Meade | 92 | 67 | 80.9 | 9.68 | |
| Gainesville | 95 | 70 | 81.8 | 8.21 | |
| Grasmere† | 94 | 68 | 82.0 | 12.20 | |
| Haywood | | | | 11.12 | |
| Homeland | 97 | 71 | 83.6 | | |
| Huntington | 96 | 67 | 80.8 | 10.79 | |
| Kissimmee | 94 | 68 | 81.1 | 11.41 | |
| Lake Butler | 94 | 67 | 80.9 | | |
| Lake City† | 94 | 69 | 81.0 | 9.05 | |
| Lakemont | 97 | | | 8.73 | |
| Lemon City | 92 | 69 | 81.6 | 9.35 | |
| Maccleny† | 96 | 69 | 81.8 | 7.43 | |
| Manatee | 94 | 66 | 80.0 | 18.48 | |
| Merritts Island | 91 | 64 | 81.0 | 8.69 | |
| Myers† | 90 | 70 | 80.6 | 11.62 | |
| New Smyrna | 90 | 67 | 79.0 | 11.19 | |
| Oakhill *[1] | 90 | 74 | 81.0 | | |
| Ocala† | 97 | 67 | 81.0 | 11.89 | |
| Orange City | 96 | 70 | 81.6 | 10.95 | |
| Orange Park | 95 | 65 | 81.4 | 18.01 | |
| Orlando† | 94 | 68 | 81.6 | 10.93 | |
| Plant City | 95 | 69 | 81.4 | 15.06 | |
| St. Andrews | 98 | 58 | 80.4 | 31.26 | |
| St. Francis† | 95 | 65 | 79.8 | 9.93 | |
| St. Francis Barracks | 89 | 68 | 79.4 | 6.10 | |
| Sebastian | 87 | 72 | 79.4 | 5.34 | |
| Stephensville | 93 | | | 16.46 | |
| Switzerland | | | | 11.32 | |
| Tallahassee† | 94 | 70 | 79.4 | 15.43 | |
| Tarpon Springs† | 94 | 71 | 80.8 | 16.05 | |

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *Florida*—Cont'd. | ° | ° | ° | *Ins* | *Ins.* |
| Wausau | 93 | 69 | 79.5 | 20.68 | |
| *Georgia.* | | | | | |
| Adairsville | 91 | 66 | 78.0 | 5.23 | |
| Alapaha | 93 | 67 | 79.8 | 8.73 | |
| Albany† | 93 | 70 | 80.2 | 11.60 | |
| Allentown† | 97 | 67 | 80.4 | 7.35 | |
| Americus† | 98 | 68 | 80.4 | 10.25 | |
| Athens *b*† | 91 | 68 | 77.4 | 5.73 | |
| Bainbridge | 97 | 68 | 79.4 | 8.91 | |
| Bellville | 95 | 67 | 79.3 | 10.48 | |
| Blakely† | 93 | 71 | 79.2 | 9.36 | |
| Brag | 96 | 67 | 79.8 | 23.02 | |
| Camak | 94 | 68 | 78.4 | 4.41 | |
| Canton† | | | | 7.34 | |
| Cartersville | 94 | 66 | 78.6 | 7.30 | |
| Clayton† | 90 | 62 | 75.4 | 11.40 | |
| Columbus | 93 | 70 | 79.1 | 11.98 | |
| Covington | 96 | 63 | 75.9 | 10.69 | |
| Crescent | 97 | 67 | 79.1 | 9.64 | |
| Dahlonega† | 91 | 61 | 73.7 | 10.69 | |
| Diamond | 88 | 59 | 72.8 | 11.74 | |
| Eastman | 98 | 69 | 81.1 | 7.61 | |
| Elberton† | 92 | 68 | 78.1 | 12.15 | |
| Fitzgerald | 94 | 69 | 79.6 | 9.58 | |
| Fleming† | 95 | 68 | 80.2 | 28.60 | |
| Fort Gaines | 94 | 63 | 79.2 | 12.67 | |
| Franklin | 91 | 68 | 77.4 | 13.29 | |
| Gainesville | 88 | 61 | 75.5 | 9.58 | |
| Gillsville† | 93 | 66 | 77.4 | 7.78 | |
| Greenbush | 92 | 62 | 76.8 | 2.45 | |
| Griffin | 95 | 67 | 78.7 | 8.80 | |
| Harrison | 92 | 71 | 80.2 | 16.41 | |
| Hephzibah *[6] | 90 | 72 | 80.2 | 11.80 | |
| Jesup | 96 | 68 | 80.0 | 18.13 | |
| Lagrange† | 95 | 67 | 76.5 | 12.71 | |
| Lawrenceville | | | | 5.42 | |
| Louisville | 97[f] | 68[f] | 79.4[f] | 8.42 | |
| Lumpkin | 91 | 69 | 77.7 | 12.44 | |
| Macon | 96 | 66 | 79.6 | 8.76 | |
| Marietta | 89 | 64 | 75.8 | 6.21 | |
| Marshallville† | 90 | 71 | 79.0 | 9.27 | |
| Mauzy | 94 | 68 | 79.2 | 13.16 | |
| Millen | 99 | 70 | 81.2 | 8.89 | |
| Morgan† | 93 | 67 | 78.6 | 14.75 | |
| Mount Vernon | 93 | 67 | 81.1 | 13.50 | |
| Newnan | 94 | 58 | 76.0 | 14.59 | |
| Point Peter | 96 | 67 | 78.4 | 8.74 | |
| Poulan† | 94 | 68 | 79.4 | 13.82 | |
| Quitman† | 93 | 67 | 79.6 | 9.04 | |
| Ramsey | 93 | 62 | 77.0 | 5.15 | |
| Rome† | 95 | 66 | 78.5 | 5.10 | |
| Talbotton† | 89 | 68 | 74.5 | 11.06 | |
| Tallapoosa | 89 | 66 | 76.1 | 10.82 | |
| Thomasville† | 94 | 70 | 79.7 | 9.78 | |
| Toccoa† | 91 | 60 | 77.4 | 9.13 | |
| Union Point | 96 | 67 | 77.8 | 7.24 | |
| Washington† | 91 | 68 | 78.4 | 7.07 | |
| Waycross | 93 | 70 | 81.0 | 9.55 | |
| Waynesboro | 92 | 63 | 77.2 | 13.60 | |
| West Point | 95 | 69 | 78.8 | 9.83 | |
| *Idaho.* | | | | | |
| Albany Falls | 99 | 46 | 65.1 | 0.07 | |
| American Falls | 102 | 44 | 72.2 | 0.40 | |
| Blackfoot† | 97 | 34 | 69.6 | 0.15 | |
| Boise Barracks | 105 | 46 | 75.2 | 0.25 | |
| Burnside† | 91 | 43 | 68.4 | 1.44 | |
| Coeur d' Alene | 100 | 32 | 73.8 | | |
| Corral *[1] | 96 | 46 | 68.6 | 0.76 | |
| Downey | 100 | 38 | 70.2 | T. | |
| Fort Sherman† | 103 | 43 | 69.9 | 2.00 | |
| Gimlet† | 94 | 40 | 69.0 | 0.62 | |
| Gray | 94 | 40 | 61.1 | 0.04 | |
| Idaho City [b] | 97 | 37 | 68.6 | T. | |
| Lake | 86 | 32 | 58.4 | 0.60 | |
| Lakeview | 90 | 48 | 68.4 | 1.24 | |
| Lewiston | 106 | 46 | 77.5 | 0.31 | |
| Lost River | 95 | | | 0.80 | |
| Marysville | 93 | 38 | 66.4 | 0.05 | |
| Minidoka | 103 | 35 | 70.4 | | |
| Moscow | 100 | 39 | 69.6 | 1.29 | |
| Murray† | 97 | 42 | 66.0 | 0.95 | |
| Ola | 99 | 46 | 71.4 | | |
| Paris | 92 | 39 | 66.2 | 0.78 | |
| Payette | 110 | 40 | 77.9 | 0.30 | |
| Pollock† | 110 | 47 | 72.6 | 0.46 | |
| St. Maries | 102 | 40 | 68.8 | 0.49 | |
| Salubria | 107 | 43 | 73.8 | 0.58 | |
| Soldier† | 100 | 34 | 66.4 | 0.26 | |
| Swan Valley† | 94 | 31 | 65.7 | 0.26 | |
| Warren† | 94 | 34 | 64.0 | 0.54 | |
| Weston [b] | 96 | 44 | 70.6 | 0.14 | |
| Yellow Jacket | | | | 0.47 | |
| *Illinois.* | | | | | |
| Albion† | 97 | 57 | 76.4 | 3.42 | |
| Alexander† | 98 | 55 | 76.2 | 3.17 | |
| Ashton *†[1] | 91 | 60 | 71.8 | 8.61 | |

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *Illinois*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| Aurora *a* | 94 | 50 | 71.7 | 4.22 | |
| Aurora *b* | 93 | 49 | 72.1 | 4.63 | |
| Bloomington | 97 | 56 | 75.6 | 1.85 | |
| Cambridge | 90 | 55 | 71.5 | 6.57 | |
| Carlinville† | 97 | 58 | 76.4 | 2.68 | |
| Carlyle | | | | 4.66 | |
| Charleston | 93 | 56 | 75.7 | 3.14 | |
| Chemung | 92 | 46 | 68.9 | 5.66 | |
| Chester | | | | 4.23 | |
| Cisne† | 94 | 56 | 75.5 | 4.91 | |
| Coatsburg | 95 | 55 | 74.0 | 2.11 | |
| Cobden† | 94 | 58 | 76.2 | 4.81 | |
| Cordova | | | | 7.07 | |
| Danville | 93 | 56 | 75.0 | 3.89 | |
| Decatur† | 98 | 50 | 75.0 | 2.16 | |
| Dixon† | 94 | 52 | 71.6 | 6.39 | |
| Dwight† | 95 | 49 | 72.6 | 3.35 | |
| Effingham† | 94 | 55 | 75.6 | 3.87 | |
| Elgin | 91 | 51 | 70.2 | 6.43 | |
| Equality | 98 | 60 | 80.2 | 1.14 | |
| Fort Sheridan | 93 | 54 | 70.2 | 2.86 | |
| Friendgrove† | | | | 3.38 | |
| Galva† | 93 | 51 | 71.6 | 7.13 | |
| Glenwood *[1] | 98[b] | 60 | 71.8[b] | 4.85 | |
| Grafton† | | | | 2.03 | |
| Grayville | 97 | 60 | 78.2 | 2.07 | |
| Greenville† | 95 | 58 | 75.8 | 2.61 | |
| Griggsville† | 96 | 57 | 75.7 | 4.49 | |
| Halliday *[2] | 94 | 64 | 79 3 | 5.29 | |
| Havana† | 94 | 59 | 75.0 | 2.78 | |
| Henry | 94 | 50 | 73.0 | 7.10 | |
| Hillsboro† | 96 | 57 | 75.6 | 2.69 | |
| Joliet† | 94 | 50 | 71.8 | 4.69 | |
| Kankakee *a* | 98 | 52 | 74.2 | 4.20 | |
| Kishwaukee | 92 | 45 | 68.8 | 8.23 | |
| Knoxville *a* | 94 | 52 | 71.4 | 10.18 | |
| Lagrange† | 93 | 50 | 70.3 | 4.59 | |
| Laharpe | 94 | 53 | 73.6 | 10.40 | |
| Lanark† | 92 | 45 | 69.8 | 7.23 | |
| Lexington | 96 | 48 | 73.0 | 2 44 | |
| Loami† | | | | 2.50 | |
| McLeansboro† | 96 | 57 | 76.2 | 5.15 | |
| Martinsville | 100 | 50 | 74.8 | 3.44 | |
| Martinton† | 95 | 46 | 72.8 | 4.03 | |
| Mascoutah *[3] | 96 | 58 | 75.2 | 5.57 | |
| Mattoon | 95 | 54 | 74.0 | | |
| Minonk† | 95 | 48 | 72.2 | 4.76 | |
| Monmouth† | 93 | 50 | 72.0 | 9.23 | |
| Morrisonville† | 91 | 54 | 73.3 | 3.38 | |
| Mount Carmel† | | | | 3.28 | |
| Mount Pulaski | 98 | 56 | 75.6 | 2.77 | |
| Mount Vernon | 98 | 53 | 74.6 | 3.18 | |
| New Burnside† | 100 | 56 | 77.9 | 3.28 | |
| Olney *a* | 96 | 54 | 76.2 | 3.58 | |
| Oswego *[1] | 92 | 56 | 70.5 | 3.75 | |
| Ottawa† | 95 | 50 | 72.3 | 4.31 | |
| Palestine† | 95 | 52 | 74.5 | 4.29 | |
| Pana | 95 | 56 | 75.4 | 3.17 | |
| Paris | 96 | 54 | 75.4 | 3.31 | |
| Peoria *a*† | | | | 3.55 | |
| Peoria *b*† | 93 | 54 | 73.5 | 3.26 | |
| Philo† | 96 | 47 | 73.4 | 2.29 | |
| Plumhill† | 94 | 59 | 75.6 | 3.98 | |
| Rantoul† | 95 | 52 | 73.6 | 3.87 | |
| Raum | 95 | 60 | 78.1 | 1.56 | |
| Reynolds | 92 | 51 | 72.0 | 7.78 | |
| Riley† | 91 | 53 | 70.2 | 4.35 | |
| Robinson | 96 | 57 | 76.0 | 3.97 | |
| Rockford | 94 | 52 | 71.0 | 5.46 | |
| Roundgrove† | 96 | 50 | 72.6 | 5.61 | |
| St. Charles *†[1] | 91 | 57 | 69.9 | 5.73 | |
| St. John† | 93[a] | 57[a] | 77 0[a] | 2.86 | |
| Scales Mound | 90 | 45 | 69.4 | 7.72 | |
| Streator† | 96 | 55 | 73.4 | 2.96 | |
| Sycamore† | 92 | 49 | 69.2 | 6.47 | |
| Tilden | 96 | 58 | 76.0 | 4.85 | |
| Tiskilwa † | 93 | 52 | 71.9 | 6.97 | |
| Tuscola† | 96 | 49 | 73.9 | 2.61 | |
| Walnut† | 93 | 51 | 72.8 | 5.51 | |
| Wheaton *[2] | | 55 | 68.8 | 5.69 | |
| Winchester *[1] | 93 | 56 | 73.3 | 5.13 | |
| Winnebago† | 91 | 49 | 69.6 | 7.13 | |
| *Indiana.* | | | | | |
| Anderson† | 91 | 55 | 73.0 | 4.86 | |
| Angola | | | | 4.10 | |
| Auburn | 95 | 49 | 71.9 | 2.50 | |
| Bedford | 98 | | | 2.75 | |
| Bloomington† | 94 | 56 | 75.0 | 4.43 | |
| Bluffton† | 96 | 47 | 72.9 | 1.73 | |
| Boonville | 99 | 56 | 78.4 | 4.48 | |
| Bright | 93 | 56 | 76.3 | 4.82 | |
| Butlerville† | 94 | 54 | 74.7 | 4.96 | |
| Cambridge City† | 93 | 50 | 72.5 | 4.55 | |
| Columbia City *[1] | 92 | 50 | 71.5 | 1.91 | |
| Columbus† | 94 | 55 | 75.2 | 4.26 | |
| Connersville† | 95 | 51 | 73.8 | 2.59 | |
| Crawfordsville | 98 | 55 | 76.0 | 3.26 | |
| Delphi† | 95 | 51 | 72.8 | 4.13 | |
| Edwardsville *†[1] | 92 | 62 | 77.9 | 2.59 | |
| Farmland† | 91 | 54 | 72.1 | 2.60 | |
| Greensburg | 95 | 58 | 75.0 | 0.94 | |
| Hammond† | 95 | 50 | 71.4 | 2.21 | |
| Hector | 92 | 51 | 73.4 | 3.53 | |
| Huntington | 94 | 52 | 73.4 | 1.97 | |
| Jasper† | 97 | 54 | 76.3 | 6.85 | |
| Jeffersonville | 94 | 60 | 77.3 | 4.62 | |
| Knightstown† | 95 | 54 | 74.0 | 3.73 | |
| Knox | | | | 5.00 | |
| Kokomo† | 90 | 55 | 72.8 | 2.42 | |
| Lafayette† | 92 | 51 | 72.6 | 4.86 | |
| Laporte | 95 | 50 | 72.8 | 3.10 | |
| Logansport *b*† | 93 | 53 | 73.2 | 2.37 | |
| Madison | 94 | 61 | 76.8 | 3.79 | |
| Marengo† | 96 | 52 | 75.7 | 3.60 | |
| Marion† | 95 | 50 | 73.1 | 2.12 | |
| Markle | 92 | 48 | 73.1 | 1.50 | |
| Mauzy† | 94 | 53 | 73.4 | 2.63 | |
| Michigan City *[10] | 94 | 55 | 71.0 | | |
| Mount Vernon† | 96 | 61 | 79.5 | 2.90 | |
| Northfield † | 91 | 53 | 72.1 | 4.53 | |
| Paoli | 94 | 58 | 75.4 | 3.56 | |
| Princeton *[1] | 98 | 56 | 74.7 | 4.30 | |
| Richmond | 92 | 50 | 73.0 | 3.32 | |
| Rockport | 92 | 60 | 76.8 | 1.65 | |
| Rockville† | 93 | 53 | 73.2 | 3.61 | |
| Scottsburg | | | | 4.45 | |
| Shelbyville | 93 | 52 | 74.4 | 2.94 | |
| South Bend† | 95 | 51 | 72.1 | 4.11 | |
| Syracuse † | | | | 3.02 | |
| Terre Haute† | 96 | 58 | 75.7 | 2.66 | |
| Topeka† | | | | 4 93 | |
| Valparaiso† | 94 | 54 | 72.1 | 4.00 | |
| Vevay | 95 | 61 | 78.6 | 2.40 | |
| Vincennes | 99 | 59 | 76.8 | 3.84 | |
| Warsaw | 92 | 51 | 71.2 | 3.26 | |
| Washington† | 99 | 55 | 76.9 | 2.81 | |
| Winamac | 97 | 46 | 71.7 | 4.84 | |
| Worthington† | 97 | 52 | 75.4 | 3.70 | |
| *Indian Territory.* | | | | | |
| Healdton† | 105 | 61 | 81.0 | 2.68 | |
| Kemp | 107 | 65 | 83.0 | 3.20 | |
| Lehigh† | 100 | 60 | 79.7 | 3.39 | |
| Purcell | 100[c] | 62[c] | 78.8[c] | 3.76 | |
| South McAlester † | | | | 3.36 | |
| Tulsa† | | | | 3.63 | |
| Wagoner | 102 | 58 | 80.0 | 1.71 | |
| *Iowa.* | | | | | |
| Adair | | | | 0.58 | |
| Afton | 99 | 49 | 75.3 | 0.59 | |
| Albia | 96 | 49 | 72.9 | | |
| Algona *[1] | 90 | 55 | 71.2 | 5.79 | |
| Alta *a*† | 96 | 48 | 71.2 | 5.49 | |
| Amana† | 94 | 49 | 72 0 | 2.61 | |
| Ames *b* | 99 | 48 | 73.3 | 3.30 | |
| Ames (near) | | | | 3.52 | |
| Atlantic† | 98 | 42 | 73.6 | 0.63 | |
| Audubon | 97 | 46 | 71.6 | 1.55 | |
| Belknap | 95 | 54 | 74.0 | 3.75 | |
| Belleplaine | | | | 7.85 | |
| Bonaparte† | 95 | 52 | 73.4 | 10.55 | |
| Britt | 95 | 40 | 68.8 | 4.35 | |
| Carroll | 99 | 45 | 72.1 | 2.58 | |
| Cedarfalls | 96 | 46 | 71.6 | 4.42 | |
| Cedar Rapids† | 98 | 53 | 73.3 | 4 38 | |
| Centerville | 96 | 52 | 76.2 | 5.12 | |
| Chariton | 96 | 50 | 73.6 | 1.41 | |
| Charles City | 96 | 37 | 68.8 | 1.38 | |
| Clarinda† | | | | 1.16 | |
| Clear Lake | 94 | 46 | 69.9 | 2.98 | |
| Clinton | 93 | 51 | 71.8 | 7.87 | |
| College Springs | 99 | 54 | 76.0 | 1.91 | |
| Corning † | 99 | 47 | 74.8 | 1.75 | |
| Council Bluffs | 103 | 57 | 77.4 | 1.57 | |
| Cresco † | 96 | 46 | 69.4 | 1.35 | |
| Decorah† | 93 | 46 | 68.7 | 1.98 | |
| Delaware *[3] | 95 | 52 | 68.6 | 2.50 | |
| Desoto | 97 | 49 | 74.7 | 2.71 | |
| Dows | 96 | 43 | 70.0 | 3.16 | |
| Eldon | 99 | 51 | 75.0 | 5.36 | |
| Eldora | 98 | 45 | 71.8 | 4.75 | |
| Elkader† | 97 | 45 | 70.8 | 1.34 | |
| Estherville | 98 | 43 | 68.7 | 4.30 | |
| Fairfield † | 96 | 49 | 73.2 | 3.53 | |
| Fayette† | 93 | 44 | 68 8 | 2.81 | |
| Forest City | 95 | 44 | 69.2 | 5.50 | |
| Fredericksburg | | | | 1.71 | |
| Glenwood † | 102 | 46 | 75.4 | 1.45 | |
| Grand Meadow *[1] | 95 | 54 | 68.1 | 1.57 | |
| Greene | 100 | 45 | 71.8 | 1.47 | |
| Greenfield | 97 | 50 | 74.8 | 1.02 | |
| Grundy Center | 95 | 47 | 70.6 | 4.75 | |
| Guthrie Center | 100 | 45 | 73.0 | 1.28 | |
| Hampton | 95 | 47 | 70.0 | 5.38 | |
| Hawkeye | | | | 2.60 | |
| Hedrick *[1] | 95[b] | 61[b] | 75.1[b] | 3.78 | |
| Hopeville† | 96 | 50 | 74.2 | 2.49 | |
| Humboldt† | 95 | 44 | 70.6 | 5.99 | |
| Independence† | 95 | 46 | 69.8 | 2.60 | |
| Indianola † | 98 | 49 | 73.6 | 3.53 | |
| Iowa City *a* | 97 | 50 | 72.4 | 2.85 | |
| Iowa Falls† | 94 | 42 | 70.5 | 3.62 | |
| Keosauqua | 97 | 52 | 75.0 | 9.06 | |
| Knoxville | 94 | 51 | 74.0 | 1.77 | |
| Lansing | 95 | 48 | 70.0 | 2.37 | |
| Larchwood | | | | 1.39 | |
| Larrabee† | 97 | 45 | 70.8 | 4.07 | |
| Leclaire | | | | 3.86 | |
| Lemars | 98 | 48 | 71.8 | 2.31 | |
| Lenox | 96 | 49 | 74.2 | 1.86 | |
| Logan† | 100 | 47 | 72.9 | 2.54 | |
| Maple Valley | | | | 4.97 | |
| Maquoketa | 93 | 43 | 69.6 | 4.34 | |
| Marshall† | 99 | 47 | 72.5 | 3.31 | |
| Mason City | 95 | 44 | 68.6 | 2.65 | |
| Millman | | | | 1.94 | |
| Monticello | 98[b] | 48[b] | 71.0[b] | 5.08 | |
| Mocar | 98 | 50 | 73.2 | 7.82 | |
| Mountayr | 97 | 50 | 75.0 | 2.36 | |
| Mount Pleasant *[1] | 93 | 62 | 74.8 | 6.36 | |
| Mount Vernon *b* | 93 | 49 | 71.2 | 3.44 | |
| Neola | 102 | 48 | 73.5 | 2.35 | |
| New Hampton | 95 | 46 | 70.4 | 1.33 | |
| Newton† | 97 | 49 | 73.4 | 4.13 | |
| North McGregor | | | | 1.66 | |
| Northwood | 94 | 45 | 68.9 | 2.81 | |
| Odebolt | 101 | 50 | 74.1 | 5.72 | |
| Ogden | 98 | 46 | 72.0 | 2.87 | |
| Olin | 92 | 49 | 70.1 | 6.37 | |
| Osage *[3] | | 55 | 66.5 | 2.61 | |
| Osceola | 97 | 50 | 74.5 | 1.48 | |
| Oskaloosa† | 98 | 48 | 72.9 | 1.85 | |
| Ottumwa | 99 | 52 | 72.9 | 5.84 | |
| Ovid† | 95 | 48 | 73.5 | 6.99 | |
| Pella | 96 | 50 | 70.6 | 1.30 | |
| Pioneer | 95 | 46 | 71.4 | 7.81 | |
| Plover | 95 | 44 | 70.4 | 6.39 | |
| Primghar | 95 | 48 | 73.2 | 2.10 | |
| Red Oak | 99 | 47 | 73.9 | 0.97 | |
| Ridgway | 95 | 50 | 70.3 | 1.99 | |
| Rockwell City | 97 | 46 | 70.2 | 3.81 | |
| Ruthven | 98 | 45 | 69.4 | 6.16 | |
| Sac City† | 96 | 47 | 72.4 | 4.20 | |
| Sibley | 98 | 45 | 67.6 | 3.06 | |
| Sidney | 98 | 55 | 76.0 | 1.45 | |
| Sigourney | 98 | 49 | 73.3 | 3.09 | |
| Spencer | 94 | 46 | 69.6 | 3.75 | |
| Spirit Lake† | 99[b] | 49[b] | 70.3[b] | 5.52 | |
| Stuart | 97 | 50 | 74.0 | 0.60 | |
| Tara | 97 | 48 | 70.2 | 2.50 | |
| Thurman | 99 | 48 | 74.7 | 1.17 | |
| Toledo | 94 | 46 | 70.9 | 5.56 | |
| Villisca | 97 | 45 | 73.6 | 1.44 | |
| Vinton *[1] | 95 | 50[c] | 70.9[c] | 1.67 | |
| Wapello | 94 | 50 | 72.5 | 7.48 | |
| Washington | 94 | 50 | 73.4 | 4.45 | |
| Washta | | | | 0.74 | |
| Waterloo | 95 | 47 | 71.0 | 3.47 | |
| Waverly | 96 | 50 | 70.4 | 2.69 | |
| Webster City | 94 | 47 | 71.7 | 1.55 | |
| Westbend *†[1] | 96 | 54 | 69.0 | 6.63 | |
| West Branch | 93 | 47[d] | 72.0 | 3.94 | |
| Whitten *[1] | 95 | 50 | 70.4 | 3.33 | |
| Wilton Junction † | 94 | 49 | 71.9 | 6.19 | |
| Winterset † | 96 | 41 | 72.2 | 1.57 | |
| *Kansas.* | | | | | |
| Abilene† | 105 | 52 | 79.8 | 2.79 | |
| Achilles | | | | 2.64 | |
| Altoona *[3] | 98 | 62 | 77.3 | 2.24 | |
| Anthony | | | | 4.50 | |
| Atchison †. | 96 | 53 | 77.2 | 3.38 | |
| Augusta | 97 | 56 | 77.4 | 3.61 | |
| Baker | 99 | 50 | 77.2 | 1.60 | |
| Beloit† | 105 | 49 | 80.4 | 1.31 | |
| Burlington † | 96 | 56 | 76.5 | 3.98 | |
| Campbell | 105 | 49 | 78.5 | 2.71 | |
| Chanute | 98[d] | 58[a] | 76.5[d] | 2.93 | |
| Colby† | 102 | 50 | 75.8 | 0.64 | |
| Columbus | 93 | 57 | 76.2 | 3.81 | |
| Coolidge† | 103 | | | 3.20 | |
| Cunningham† | 104[c] | 51[c] | 78.2[c] | 2.27 | |
| Delphos | 106 | 48 | 80.2 | 1.47 | |
| Dresden | 101[c] | 51[c] | 76.3[c] | 0.95 | |
| Ellinwood † | 99 | 52 | 77.6 | 3.15 | |
| Emporia | 93 | 55 | 75.4 | 2.36 | |
| Englewood † | 103 | 54 | 78.6 | 1.34 | |
| Eskridge | 96 | 56 | 77.0 | 3.43 | |
| Eureka | | | | 1.54 | |
| Eureka Ranch† | 108 | 49 | 79.6 | 0.78 | |

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *Kansas*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| Fallriver | 99 | 57 | 77.8 | 1.53 | |
| Fanning | ..... | ..... | ..... | 2.25 | |
| Fort Riley † | 101 | 58 | 79.1 | 1.03 | |
| Fort Scott †. | 99 | 57 | 77.4 | 0.80 | |
| Frankfort | 104 | 46 | 78.0 | 2.41 | |
| Garden City | 98 | 54 | 76.7 | 2.04 | |
| Garfield | ..... | ..... | ..... | 2.12 | |
| Gibson | 105 | 50 | 78.6 | 1.17 | |
| Gove *[1]. | 103 | 71 | 82.3 | 0.91 | |
| Grenola | 95 | 56 | 75.6 | 3.01 | |
| Halstead | 96 | 50 | 74.5 | 5.05 | |
| Hays | 105 | 49 | 78.8 | 1.40 | |
| Horton | 98 | 53 | 77.7 | 2.07 | |
| Hoxie | ..... | 48 | ..... | 0.00 | |
| Hutchinson | ..... | ..... | ..... | 5.49 | |
| Independence | 98 | 59 | 78.6 | 2.31 | |
| Lawrence | 94 | 56 | 77.0 | 3.46 | |
| Lebanon | 105 | ..... | ..... | 1.00 | |
| Lebo † | 95 | 56 | 76.6 | 5.01 | |
| Macksville | 99 | 53 | 76.1 | 2.63 | |
| McPherson | 104 | 54 | 79.9 | 2.56 | |
| Manhattan *b* | 104 | 53 | 79.4 | 1.78 | |
| Manhattan *c* | 102 | 50 | 77.9 | 1.52 | |
| Marion † | 99 | 55 | 81.5 | 2.25 | |
| Meade † | 108 | 60 | 82.8 | 0.46 | |
| Medicine Lodge † | 101 | 56 | 79.0 | 2.54 | |
| Minneapolis † | 108 | 47 | 81.2 | 0.71 | |
| Morantown † | 92 | 56 | 75.4 | 4.04 | |
| Mounthope *[1] | 97 | 64 | 78.0 | 2.96 | |
| Ness City | 102 | 56 | 80.3 | 1.86 | |
| Newton | 100 | 54 | 77.4 | 4.18 | |
| Norton | ..... | ..... | ..... | 1.87 | |
| Norwich | ..... | ..... | ..... | 5.68 | |
| Oberlin | ..... | ..... | ..... | 1.35 | |
| Olathe † | 94 | 55 | 76.3 | 5.27 | |
| Osage City † | 96 | 55 | 77.2 | 6.30 | |
| Oswego | 96* | 58 | 78.2 | 3.60 | |
| Ottawa | 96 | 53 | 74.8 | 4.93 | |
| Phillipsburg | 106 | 50 | 77.3 | 1.57 | |
| Pratt | 103 | 51 | 80.0 | 4.80 | |
| Rome *† [1] | 96 | 59 | 76.6 | 4.88 | |
| Russell | 107 | 50 | 79.6 | 1.39 | |
| Salina † | 106 | 50 | 81.2 | 0.97 | |
| Sedan † | 96 | 58 | 77.2 | 3.23 | |
| Toronto | 102 | 55 | 77.2 | 1.77 | |
| Ulysses | ..... | ..... | ..... | 2.65 | |
| Viroqua † | 101 | 54 | 77.4 | 2.68 | |
| Wallace | ..... | ..... | ..... | 1.20 | |
| Wamego *[1] | 100 | 56 | 80.1 | 2.28 | |
| Winfield | ..... | ..... | ..... | 3.69 | |
| Winona | ..... | ..... | ..... | 2.00 | |
| Yates Center | 96 | 54 | 76.2 | 2.06 | |
| *Kentucky.* | | | | | |
| Alpha *[3] | ..... | 66 | 77.6 | 9.86 | |
| Ashland | 96 | 59 | 77.2 | 3.67 | |
| Bardstown † | 98 | 59 | 77.4 | 2.02 | |
| Blandville † | 92 | 59 | 76.6 | 3.99 | |
| Bowling Green *b* † | 94 | 61 | 78.2 | 3.80 | |
| Burnside † | ..... | ..... | ..... | 6.93 | |
| Caddo | 94 | 58 | 76.4 | 3.29 | |
| Canton *[1] | 95 | 60 | 76.3 | 2.82 | |
| Carlisle | 96 | 57 | 77.0 | 3.77 | |
| Carrollton | 98 | 62 | 79.0 | 2.82 | |
| Catlettsburg | ..... | ..... | ..... | 6.93 | |
| Earlington | 98 | 58 | 78.1 | 2.19 | |
| Edmonton † | 90 | 58 | 74.9 | 2.04 | |
| Ensor | 93 | 58 | 76.1 | 4.34 | |
| Eubank | 92 | 58 | 74.7 | 3.40 | |
| Falmouth † | ..... | ..... | ..... | 3.74 | |
| Frankfort | 91[4] | 58[4] | 74.6[4] | 3.94 | |
| Georgetown [5] | 92 | 61 | 77.0 | ..... | |
| Greensburg † | 99 | 58 | 77.7 | 1.81 | |
| Henderson † | 98 | 60 | 78.6 | 1.98 | |
| Hopkinsville † | 96 | 59 | 78.6 | 1.73 | |
| Irvington | 93 | 60 | 75.8 | 6.19 | |
| Leitchfield † | 95 | 59 | 76.1 | 1.59 | |
| Loretto | 95 | 55 | 76.1 | 3.18 | |
| Maysville | 97 | 55 | 77.2 | 5.47 | |
| Middlesboro † | 92 | 58 | 76.2 | 5.55 | |
| Mount Hermon | 91 | 60 | 76.4 | 3.23 | |
| Mount Sterling † | 94 | 60 | 76.0 | 2.95 | |
| Owensboro † | 93 | 59 | 75.5 | 3.46 | |
| Owenton † | 92 | 55 | 75.6 | 4.97 | |
| Paducah *a* † | ..... | ..... | ..... | 2.68 | |
| Paducah *b* † | 100 | 61 | 80.5 | 2.72 | |
| Princeton | 97 | 55 | 77.8 | 4.60 | |
| Richmond † | 95 | 61 | 77.4 | 4.64 | |
| Russellville † | 100 | 57 | 79.8 | 3.45 | |
| St. John † | 92 | 58 | 75.0 | 3.22 | |
| Scott | 94 | 56 | 75.5 | 5.03 | |
| Shelby City | 96 | 56 | 77.0 | 3.77 | |
| Shelbyville † | 99 | 59 | 78.2 | 2.19 | |
| Vanceburg | 95 | 58 | 74.9 | 3.50 | |
| Williamsburg † | 95 | 61 | 77.3 | 7.55 | |
| Woodburn | ..... | ..... | ..... | 1.10 | |

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *Louisiana.* | ° | ° | ° | *Ins.* | *Ins.* |
| Abbeville | 98 | 71 | 80.9 | 9.70 | |
| Alexandria † | 96 | 66 | 81.4 | 5.01 | |
| Amite † | 97 | 70 | 81.2 | 9.92 | |
| Bastrop † | 98 | 64 | 81.7 | 3.67 | |
| Baton Rouge † | 95 | 67 | 81.4 | 5.62 | |
| Calhoun | 96 | 64 | 80.0 | 2.26 | |
| Cheneyville † | 96 | 67 | 81.5 | 3.66 | |
| Clinton † | 93 | 68 | 79.8 | 7.71 | |
| Como | 96 | 67 | 80.6 | 1.39 | |
| Covington | 96 | 70 | 81.2 | 13.76 | |
| Donaldsonville | 96 | 70 | 82.0 | 5.95 | |
| Emille | 92 | 68 | 78.7 | 8.60 | |
| Farmerville | 94 | 64 | 79.9 | 3.67 | |
| Franklin † | ..... | 76 | ..... | 11.60 | |
| Grand Coteau | 95 | 69 | 81.4 | 5.23 | |
| Hammond | 97 | 70 | 81.5 | 10.78 | |
| Jeanerette | 100 | 67 | 81.5 | 11.97 | |
| Jennings | 96 | ..... | ..... | 5.86 | |
| Lafayette | 95 | 69 | 81.2 | 10.99 | |
| Lake Charles † | 98 | 69 | 82.6 | 6.81 | |
| Lake Providence | 96 | 69 | 82.2 | 4.22 | |
| Lawrence | 93 | 70 | 82.0 | 10.27 | |
| Liberty Hill | 102 | 64 | 81.7 | 3.70 | |
| Mansfield | 96 | 75 | 80.5 | 2.72 | |
| Melville | 95 | 69 | 81.2 | 2.93 | |
| Minden | 96 | 68 | 81.6 | 3.67 | |
| Monroe † | 97 | 68 | 81.8 | 3.96 | |
| Montgomery | 99 | 66 | 82.6 | 3.49 | |
| Oakridge | 100 | 65 | 81.8 | 4.62 | |
| Opelousas | 95 | 67 | 81.2 | 5.58 | |
| Oxford | 98° | 63[4] | 80.8° | 1.59 | |
| Palncourtville † | 96 | 69 | 81.4 | 8.00 | |
| Plain Dealing † | 99 | 61 | 80.9 | 3.45 | |
| Plaquemine | 96 | 69 | 81.3 | 6.33 | |
| Rayne [6] | 98 | 69 | 82.0 | 4.17 | |
| Robeline | 97 | 62 | 78.8 | 3.55 | |
| Ruston | 93[6] | 60[6] | 77.4[6] | 2.31 | |
| Schriever. | ..... | 68 | ..... | 8.02 | |
| Shellbeach | 93 | 73 | 82.0 | 2.63 | |
| Southern University † | 92 | 68 | 78.5 | 5.80 | |
| Sugar Ex. Station † | 93 | 71 | 80.6 | 7.58 | |
| Sugartown | 92 | 69 | 80.7 | 7.98 | |
| Venice † | 91 | 69 | 79.8 | 14.39 | |
| Wallace | 96 | 70 | 80.9 | 10.17 | |
| Whitehall | 97 | 68 | 80.4 | ..... | |
| White Sulphur Springs | 97 | 59 | 80.4 | 4.79 | |
| *Maine.* | | | | | |
| Bar Harbor | 86 | 46 | 67.2 | 1.92 | |
| Belfast *[6] | 81 | 61 | 67.9 | 2.31 | |
| Calais | 84 | 43 | 67 0 | 2.98 | |
| Cornish *[1] | 91 | 48 | 68.9 | 3.13 | |
| Cumberland Mills | 92 | 47 | 71.7 | 2.79 | |
| Fairfield | 85 | 43 | 67.8 | 3.71 | |
| Farmington | 88 | 39 | 68 0 | 3.27 | |
| Flagstaff | 87 | 33 | 63.6 | 3.60 | |
| Gardiner | 91 | 48 | 71.0 | 3.73 | |
| Kineo | 90 | 50 | 67.0 | 3.30 | |
| Lewiston | 89 | 48 | 71.1 | 2.21 | |
| Mayfield *[1] | 83 | 45 | 65.5 | 4.43 | |
| North Bridgton | 91 | 46 | 69.6 | 2.46 | |
| Orono | 85 | 41 | 67.5 | 3.14 | |
| Petit Menan *[1] | 78 | 50 | 59.7 | ..... | |
| Winslow | 88 | 40 | 67.0 | 3.09 | |
| *Maryland.* | | | | | |
| Annapolis | 94 | 61 | 80.3 | 2.81 | |
| Bachmans Valley | 91 | 51 | 76.9 | 4.98 | |
| Boettcherville | 98 | 50 | 74.4 | 5.15 | |
| Charlotte Hall † | 97 | 55 | 76.4 | 4.00 | |
| Cherryfields † [3] | ..... | ..... | 77.4 | 6.56 | |
| Chestertown | 90 | 57 | 76.0 | 7.62 | |
| Collegepark | 96 | 54 | 77.0 | 6.08 | |
| Cumberland *b* | 93 | 57 | 75.3 | 6.17 | |
| Darlington † | 90 | 59 | 74.3 | 10.39 | |
| Deerpark | 89 | 46 | 67.0 | 7.01 | |
| Easton † | 95 | 57 | 77.6 | 4.98 | |
| Ellicott City | 93 | 53 | 74.3 | 6.15 | |
| Fallston | 88 | 55 | 73.3 | 9.35 | |
| Frederick | 94 | 54 | 76.4 | 6.34 | |
| Frostburg | ..... | 48 | ..... | 7.05 | |
| Grantsville | 89 | 47 | 69.0 | 8.93 | |
| Greatfalls [5] | 93 | 54* | 76.2 | 5.57 | |
| Greenspring Furnace | 95 | 52 | 70.0 | 6.27 | |
| Hancock | 97[4] | 59[4] | 75.8[4] | 4.99 | |
| Jewell † | 93 | 57 | 75.8 | 4.17 | |
| Johns Hopkins Hospital | 95 | 56 | 76.4 | 6.34 | |
| Kensington | 95 | 53 | 76.4 | 6.89 | |
| Laurel | 98 | 60 | 77.8 | 7.30 | |
| Mount St. Marys Coll. † | 92 | 55 | 73.7 | 8.92 | |
| New Market | 95 | 52 | 75.6 | 5.80 | |
| Pocomoke City | 95 | 64 | 80.1 | 5.50 | |
| Princess Anne | 92 | 57 | 76.5 | 8.39 | |
| Sharpsburg | 92 | 54 | 74.4 | 4.78 | |
| Solomons † | 94 | 66 | 79.7 | 7.88 | |
| Sunnyside | 88 | 48 | 66.5 | 7.66 | |
| Taneytown † | 92 | 50 | 74.8 | 8.42 | |
| Van Bibber | 94 | 56 | 75.4 | 8.16 | |

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *Maryland*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| Westernport | 96 | 53 | 73.4 | 7 60 | |
| Woodstock | 92 | 52 | 75.3 | 6.03 | |
| *Massachusetts.* | | | | | |
| Adams | 86 | 45 | 68.1 | ..... | |
| Amherst | 89 | 44 | 70.1 | 6.42 | |
| Attleboro | ..... | ..... | ..... | 7.01 | |
| Bedford | 88 | 47 | 69.9 | 9.15 | |
| Bluehill (summit) | 90 | 51 | 70.3 | 6.56 | |
| Cambridge *a* | 92 | 49 | 72.4 | 7.29 | |
| Chestnut Hill | 94 | 48 | 72.6 | 6.06 | |
| Cohasset | ..... | ..... | ..... | 8.95 | |
| Concord | 93 | 46 | 70.6 | 8.94 | |
| Dudley [1] | 90* | 50 | 66.4 | 5.77 | |
| East Templeton *[1] | 86 | 53 | 66.8 | 6.91 | |
| Fallriver | 87 | 56 | 72.0 | 7.43 | |
| Fiskdale | ..... | ..... | ..... | 7.28 | |
| Fitchburg *a* *[1] | 88 | 53 | 69.6 | 7.80 | |
| Fitchburg *b* | 90 | 47 | 70.6 | 7.67 | |
| Framingham | 92 | 45 | 72.4 | 7.42 | |
| Groton | 90 | 44 | 69.8 | 8.94 | |
| Hyannis *† [1] | 85 | 55 | 70.7 | 4.46 | |
| Jefferson | ..... | ..... | ..... | 11.89 | |
| Lawrence | 91 | 50 | 72.0 | 7.56 | |
| Leeds | 90 | 43 | 68.9 | 6.87 | |
| Leicester Hill | 90 | 49 | 69.6 | 9.34 | |
| Leominster | ..... | ..... | ..... | 9.30 | |
| Long Plain | ..... | ..... | ..... | 7.06 | |
| Lowell *a* | 89 | 48 | 71.9 | 8.23 | |
| Lowell *b* | 92 | 46 | 71.2 | ..... | |
| Ludlow | 85 | 41 | 68.0 | 8.30 | |
| Mansfield *[1] | 89 | 47 | 69.6 | 8.25 | |
| Middleboro | 88 | 44 | 71.2 | 5.29 | |
| Monson | 90 | 45 | 70.8 | 10.00 | |
| New Bedford *a* | 86 | 52 | 70.8 | 7.68 | |
| New Bedford *b* | 88 | 46 | 71.2 | 7.32 | |
| New Salem | 87 | 50 | 69.0 | 5.84 | |
| Pittsfield | 86 | 45 | 68.8 | 9.26 | |
| Plymouth *[1] | 87 | 57 | 71.5 | 4.91 | |
| Princeton | ..... | ..... | ..... | 9.96 | |
| Provincetown | 85 | 56 | 71.5 | 5.84 | |
| Somerset *[1] | 93 | 52 | 75.1 | 5 60 | |
| South Clinton | ..... | ..... | ..... | 10.72 | |
| Springfield Armory | 92 | 40 | 69.2 | 6.52 | |
| Sterling | ..... | ..... | ..... | 9.88 | |
| Taunton *b* | 89 | 42 | 70.8 | 5.07 | |
| Taunton *c* | 89 | 42 | 71.0 | 5.07 | |
| Webster | ..... | ..... | ..... | 6.79 | |
| Westboro † | 92 | 44 | 72.3 | 9.02 | |
| Weston | 88 | 46 | 70.0 | 7.15 | |
| Williamstown | 85 | 46 | 66.6 | 8.51 | |
| Winchendon | ..... | ..... | ..... | 5.89 | |
| Worcester *a* | 87 | 52 | 73.5 | 9.69 | |
| *Michigan.* | | | | | |
| Adrian | 96 | 44 | 71.2 | 1.80 | |
| Agricultural College | 95 | 43 | 69.0 | 2.73 | |
| Allegan | 94 | 45 | 69.6 | 0.91 | |
| Alma | 92 | 43 | 68.7 | 4.33 | |
| Ann Arbor | 100 | 46 | 72.8 | 1.16 | |
| Arbela | 97 | 42 | 69.8 | 3.07 | |
| Badaxe | 91 | 45 | 68.3 | 3.65 | |
| Baldwin | 94 | 40 | 66.0 | 2.74 | |
| Ball Mountain | 96 | 45 | 70.5 | 1.47 | |
| Baraga | 93 | 40 | 63.0 | 2.89 | |
| Battlecreek | 97 | 48 | 71.9 | 1.47 | |
| Bay City *b* | 93 | 47 | 68.2 | 2.96 | |
| Berlin | 97 | 40 | 69.4 | 1.43 | |
| Berrien Springs | 97 | 49 | 71.6 | 2.48 | |
| Big Point Sable | 82 | 50 | 65.9 | ..... | |
| Big Rapids | 90 | 44 | 66.8 | 5.08 | |
| Birmingham | 96 | 48 | 71.9 | 1.19 | |
| Boon | 89 | 39° | 63.9 | 5.85 | |
| Calumet | 80 | 47 | 61.5 | 3.62 | |
| Camden | 96 | 45 | 70.8 | 3.02 | |
| Carsonville | 96 | 43 | 68.8 | 1.12 | |
| Charlevoix | 91 | 49 | 65.4 | 4.12 | |
| Cheboygan | 94 | 42 | 65.1 | 2.45 | |
| Clinton | 97 | 42 | 72.3 | 1.64 | |
| Coldwater | 93 | 47 | 70.8 | 4.96 | |
| East Tawas | 94 | 48 | 66.8 | 2.83 | |
| Eloise | 98 | 44 | 71.5 | 1.44 | |
| Escanaba † | 87 | 43 | 65.2 | 4.65 | |
| Ewen | 91 | 40 | 65.4 | 1.56 | |
| Fairview | 92 | 48 | 69.5 | 1.75 | |
| Fitchburg | 96 | 41 | 69.4 | 2.27 | |
| Flint | 96 | 43 | 69.6 | 3.28 | |
| Frankfort | 84 | 51 | 65.5 | ..... | |
| Gladwin | 93 | 43 | 67.1 | 5.92 | |
| Grand Rapids *b* | 93 | 50 | 70.8 | 1.87 | |
| Grape | 97 | 45 | 72.5 | 1.48 | |
| Grayling | 94 | 38 | 64.3 | 5.60 | |
| Grindstone City *[10] | 80 | 46 | 65.2 | ..... | |
| Hammonds Bay *[10] | 82 | 52 | 66.1 | ..... | |
| Hanover | 95 | 45 | 70.2 | 2.99 | |
| Harrisville | 97 | 47 | 66.5 | 3.18 | |
| Hart | 93 | 46 | 67.4 | 2.58 | |
| Hastings | 95 | 44 | 70.2 | 2.62 | |

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *Michigan*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| Hayes | 90 | 45 | 65.5 | 3.57 | |
| Highland Station | ..... | ..... | ..... | 1.57 | |
| Hillsdale | 93 | 45 | 69.8 | 2.88 | |
| Holland *10 | 82 | 56 | 71.0 | ..... | |
| Humboldt | 92 | 31 | 58.4 | 0.77 | |
| Ionia | 95* | 47* | 69.8* | 3.19 | |
| Iron River | 93 | 30 | 59.2 | 2.19 | |
| Ishpeming | 93 | 38 | 61.3 | 1.25 | |
| Ivan | 90 | 42 | 65.6 | 4.90 | |
| Jackson | 97 | 45 | 71.0 | 2.16 | |
| Jeddo | 97 | 46 | 68.8 | 2.45 | |
| Kalamazoo | 97 | 50 | 71.8 | 1.97 | |
| Lake City | 90 | 42 | 65.4 | 5.85 | |
| Lansing | 94 | 48 | 69.8 | 3.32 | |
| Lapeer | 92 | 41 | 69.0 | 1.35 | |
| Lathrop | 95 | 32 | 60.6 | 1.96 | |
| Ludington | 84 | 40 | 65.4 | 2.61 | |
| Luzerne | 87 | 39 | 64.0 | 4.55 | |
| Mackinaw City | 90 | 39 | 62.9 | 4.58 | |
| Madison | 96 | 45 | 72.3 | 2.15 | |
| Mancelona | 88 | 40 | 64.0 | 5.08 | |
| Manistee | 92 | 38 | 67.2 | 2.90 | |
| Manistique | 80 | 38 | 62.4 | 3.30 | |
| Middle Island *10 | 85 | 56 | 66.2 | ..... | |
| Midland | 93 | 45 | 69.0 | 3.00 | |
| Mottville | 96 | 48 | 70.4 | 5.16 | |
| Mount Clemens | 100 | 45 | 70.5 | 0.75 | |
| Mount Pleasant *b | 91 | 46 | 69.4 | 4.49 | |
| Muskallongee Lake *10 | 81 | 46 | 60.8 | ..... | |
| Muskegon | 85 | 51 | 68.4 | 2.20 | |
| Newberry | 88 | 28 | 59.4 | 2.42 | |
| North Manitou Island *10 | 84 | 55 | 68.2 | ..... | |
| North Marshall | 97 | 45 | 70.6 | 1.39 | |
| Northport | 86 | 48 | 65.0 | 2.95 | |
| Old Mission | 88 | 51 | 66.6 | 4.67 | |
| Olivet | 93 | 49 | 69.9 | 2.64 | |
| Omer | 94 | 37 | 65.5 | 4.22 | |
| Ottawa Point *10 | 94 | 50 | 68.3 | ..... | |
| Ovid | 95 | 44 | 70.4 | 2.09 | |
| Owosso | 101 | 43 | 71.6 | 2.50 | |
| Parkville | ..... | ..... | ..... | 4.59 | |
| Pentwater *10 | 84 | 56 | 69.4 | ..... | |
| Petoskey | 91 | 44 | 63.5 | 3.08 | |
| Plymouth | 98 | 44[d] | 70.9 | 1.47 | |
| Pointe aux Barques *10 | 92 | 52 | 69.8 | ..... | |
| Point Betsey *10 | 79 | 54 | 66.6 | ..... | |
| Port Austin | 92 | 43 | 66.0 | 4.48 | |
| Powers | 95 | 36 | 62.2 | ..... | |
| Reed City | 92 | 43 | 66.8 | 1.37 | |
| Rockland | 84 | 42 | 62.2 | ..... | |
| Rogers | 85 | 44 | 62.8 | 3.15 | |
| Saginaw | 96 | 47 | 70.8 | 4.72 | |
| St. Ignace | 84 | 42 | 64.1 | 3.30 | |
| St. Johns | 96 | 46 | 71.4 | 0.96 | |
| St. Joseph | 90 | 52 | 69.4 | 2.42 | |
| Sandbeach *a | 92 | 49 | 67.4 | 3.89 | |
| Sidnaw | 96 | 30 | 60.7 | 2.25 | |
| Somerset | 93 | 45 | 71.2 | 2.11 | |
| South Haven | 90 | 47 | 69.1 | 1.70 | |
| Stanton | 91 | 46 | 69.0 | 3.77 | |
| Sturgeon Point *10 | 90 | 45 | 66.5 | ..... | |
| Thomaston | 94 | 40 | 65.6 | 0.80 | |
| Thornville | 87 | 45 | 70.1 | 2.27 | |
| Thunder Bay Island *10 | 90 | 56 | 67.0 | ..... | |
| Traverse City | 94 | 44 | 65.0 | 4.87 | |
| Two Heart River *10 | 86 | 40 | 61.6 | ..... | |
| Vandalia | 93 | 50 | 70.7 | 3.76 | |
| Vassar | 95 | 39 | 68.8 | 2.93 | |
| Vermillion Point *10 | 78 | 38 | 55.2 | ..... | |
| Wasepi | 92 | 48 | 70.0 | 4.96 | |
| Waverly | 92 | 45 | 68.2 | 1.39 | |
| West Harrisville | 91 | 45 | 65.4 | 4.12 | |
| Wetmore | 91 | 31 | 61.0 | 2.74 | |
| White Cloud | 89 | 45 | 68.6 | 2.72 | |
| Williamston | 91 | 43 | 69.4 | 2.59 | |
| Ypsilanti | 96 | 48 | 71.0 | 1.05 | |
| *Minnesota.* | | | | | |
| Ada† | .... | ..... | ..... | 2.78 | |
| Albert Lea | 94 | 45 | 67.8 | 4.06 | |
| Alexandria† | 92 | 46 | 67.4 | 2.03 | |
| Beardsley | 100 | 37 | 66.2 | 0.79 | |
| Bingham Lake | 96 | 44 | 69.0 | 5.30 | |
| Bird Island | 95 | 45 | 68.6 | 4.82 | |
| Blooming Prairie† | 97 | 44 | 68.2 | 3.05 | |
| Caledonia† | 94 | 48 | 68.6 | 2.39 | |
| Camden | 93 | 43 | 67.5 | 3.20 | |
| Campbell | 92 | 38 | 65.8 | 2.64 | |
| Collegeville | 90 | 49 | 68.2 | 3.68 | |
| Crookston† | 89 | 36 | 64.4 | 2.47 | |
| Deephaven | ..... | ..... | ..... | 3.12 | |
| Detroit City | 88 | 36 | 64.0 | 2.62 | |
| Faribault | 96 | 44 | 68.2 | 3.82 | |
| Farmington† | 95 | 40 | 66.0 | 2.32 | |
| Fergus Falls† | 90 | 43 | 66.7 | 1.85 | |
| Grand Meadow† | 97 | 46 | 69.9 | 2.32 | |
| Granite Falls | 93 | 43 | 67.4 | 5.23 | |
| *Minnesota*—Cont'd. | | | | | |
| Koochicking | 85 | 37 | 62.0 | 1.60 | |
| Lake City | 98 | 45 | 69.5 | 3.34 | |
| Lake Jennie | 92 | 47 | 68.9 | 5.92 | |
| Lakeside† | 91 | 45 | 68.4 | 5.71 | |
| Lake Winnibigoshish | 82 | 42 | 63.0 | 2.80 | |
| Leech Lake | 87 | 40 | 64.6 | 4.65 | |
| Lutsen | 79 | 43 | 61.1 | 3.52 | |
| Luverne† | 96 | 47 | 69.4 | 4.08 | |
| Lynd | 100 | 44 | 67.6 | 2.74 | |
| Mapleplain | ..... | ..... | ..... | 3.24 | |
| Milaca | 92 | 40 | 64.4 | 2.38 | |
| Milan† | 99 | 40 | 68.2 | 2.61 | |
| Minneapolis *a | 95 | 44 | 68.3 | 3.01 | |
| Minneapolis *b[1] | 93* | 42 | 67.1 | 2.78 | |
| Minnesota City† | ..... | ..... | ..... | 2.55 | |
| Montevideo | 96 | 45 | 67.9 | 6.17 | |
| Morris | 94 | 44 | 67.8 | 0.86 | |
| Mount Iron | 91 | 37 | 60.9 | 3.40 | |
| Newfolden | 88 | 37 | 63.7 | 1.11 | |
| New London | 100 | 46 | 68.8 | 3.02 | |
| New Richland *[1] | 94 | 56 | 68.5 | ..... | |
| New Ulm† | 96 | 40 | 68.2 | 5.83 | |
| Park Rapids† | 85 | 38 | 62.3 | 2.85 | |
| Pine River | 88 | 44 | 64.6 | 3.75 | |
| Pipestone | ..... | ..... | ..... | 2.91 | |
| Pleasant Mounds | 93 | 4[5] | 68.6 | 4.33 | |
| Pokegama Falls | 86 | 36 | 61.8 | 4.01 | |
| Redwing | ..... | ..... | ..... | 3.80 | |
| Reeds | ..... | ..... | ..... | 3.20 | |
| Rolling Green | 93 | 47 | 68.2 | 2.60 | |
| Roseau | 86° | 33° | 61.6° | 1.32 | |
| St. Charles† | 97 | 42 | 69.0 | 1.97 | |
| St. Cloud | 91 | 45 | 66.9 | 3.34 | |
| St. Olaf | 91 | 46 | 67.6 | 2.38 | |
| St. Peter | 89 | ..... | ..... | 5.91 | |
| Sandy Lake Dam | 85 | 39 | 62.6 | 3.12 | |
| Shakopee | 95 | 48 | 70.8 | 3.08 | |
| Slayton | 99 | 45 | 68.6 | 3.73 | |
| Tower† | 85 | .. .. | ..... | 1.50 | |
| Two Harbors | 88 | 45 | 62.8 | 3.73 | |
| Wabasha *[1] | 102 | 51 | 69.1 | 2.40 | |
| Willmar | 92 | 45 | 67.6 | 4.36 | |
| Winnebago City | 95 | 46 | 68.4 | 5.10 | |
| Worthington | 94 | 47 | 68.3 | 4.11 | |
| Zumbrota[1] | 98* | 42 | 69.6 | ..... | |
| *Mississippi.* | | | | | |
| Aberdeen | 100 | 62 | 80.2 | 4.08 | |
| Agricultural College | 95 | 67 | 79.8 | 5.71 | |
| Austin† | 96 | 63 | 79.0 | 2.99 | |
| Batesville† | 95 | 62 | 78.2 | 4.11 | |
| Bay St. Louis | 97 | 70 | 80.0 | 12.49 | |
| Biloxi† | 91 | 70 | 79.2 | 12.53 | |
| Booneville | 96 | 64 | 79.6 | 2.33 | |
| Briers | 90 | 69 | 79.7 | 3.98 | |
| Brookhaven† | 101 | 65 | 82.0 | 9.43 | |
| Canton† | 99 | 67 | 80.4 | 8.61 | |
| Columbus *a | ..... | ..... | ..... | 2.46 | |
| Columbus *b | 103 | 62 | 82.3 | 2.34 | |
| Corinth | 96 | 64 | 79.4 | 2.08 | |
| Crystal Springs† | 95 | 67 | 79.6 | 4.31 | |
| Edwards | 98 | 70 | 82.3 | 6.92 | |
| Fayette | 96 | 68 | 80.7 | 7.12 | |
| French Camps | 95 | 59 | 76.7 | 6.00 | |
| Greenville *a | 91 | 68 | 79.2 | 7.95 | |
| Greenville *b† | 94 | 68 | 80.8 | 7.51 | |
| Greenwood | 95 | 67 | 80.2 | 1.83 | |
| Hattiesburg† | 98 | 70 | 82.1 | 2.30 | |
| Hazlehurst | 98 | 69 | 81.4 | 1.89 | |
| Hernando | 96 | 64 | 79.8 | 3.35 | |
| Holly Springs† | 94 | 64 | 79.4 | 3.74 | |
| Jackson† | 99 | 69 | 80.8 | 7.07 | |
| Lake† | 97 | 66 | 78.8 | 7.87 | |
| Leakesville | 99 | 68 | 81.2 | 8.66 | |
| Logtown† | 93 | 67 | 79.8 | 11.38 | |
| Louisville† | 97 | 65 | 78.8 | 6.00 | |
| Macon† | 99 | 68 | 81.0 | 6.07 | |
| Magnolia† | 92 | 68 | 78.9 | 8.46 | |
| Meridian | 98 | 67 | 80.4 | 8.59 | |
| Moss Point | 93 | 71 | 81.4 | 16.95 | |
| Natchez† | 96 | 68 | 81.8 | 5.75 | |
| Okolona† | 98 | ..... | ... .. | 3.57 | |
| Palo Alto | 97 | 68 | 80.6 | 6.02 | |
| Pontotoc | 94 | 62 | 79.1 | 4.63 | |
| Port Gibson† | 98 | 66 | 81.4 | 2.87 | |
| Rosedale | 95 | 63 | 80.0 | ..... | |
| Stonington *[1] | 92 | 70 | 78.6 | ..... | |
| Thornton | ..... | ..... | ..... | 6.20 | |
| Tupelo† | ..... | ..... | ..... | 3.51 | |
| Water Valley *†[1] | 96 | 65 | 77.4 | 1.98 | |
| Waynesboro | 97 | 68 | 81.6 | 5.55 | |
| Windham | 95 | 67 | 80.2 | 8.42 | |
| Woodville† | 92 | 67 | 79.8 | 7.62 | |
| Yazoo City† | 101 | 66 | 68.2 | 5.57 | |
| *Missouri.* | | | | | |
| Akron | .. .. | ..... | ..... | 2.37 | |
| Appleton City | 99 | 56 | 77.4 | 1.71 | |
| *Missouri*—Cont'd. | | | | | |
| Arthur *[3] | ..... | 63 | 75.2 | 1.63 | |
| Avalon | 94 | 53 | 75.0 | 2.46 | |
| Bethany | 95 | 50 | 75.4 | 3.00 | |
| Birchtree | 93 | 54 | 73.8 | 4.75 | |
| Bolckow | ..... | ..... | ..... | 0.40 | |
| Boonville† | ..... | ..... | ..... | 1.23 | |
| Brunswick | 92 | 55 | 74.6 | 5.15 | |
| Carrollton† | 94 | 57 | 76.2 | 3.42 | |
| Conception | 95 | 54 | 75.6 | 1.52 | |
| Cowgill *[5] | 99 | 50 | 77.3 | 5.00 | |
| Darksville | 96 | 52 | 74.4 | 1.90 | |
| Downing | ..... | ..... | ..... | 2.66 | |
| East Lynne *[3] | ..... | 57 | 72.1 | 3.75 | |
| Edgehill *[5] | 90 | 58 | 74.3 | 6.33 | |
| Eightmile *[1] | 91 | 58 | 73.2 | 3.78 | |
| Eldon | 99 | ..... | ..... | 2.44 | |
| Elmira | 96 | 50 | 75.2 | 3.56 | |
| Fairport | ..... | ..... | ..... | 4.24 | |
| Farmersville | ..... | ..... | ..... | 4.53 | |
| Fayette | ..... | ..... | ..... | 1.44 | |
| Fulton | ..... | ..... | ..... | 1.29 | |
| Gallatin *[1] | 99 | 56 | 76.5 | 5.39 | |
| Glasgow | 98 | 52 | 76.7 | 1.60 | |
| Gordonville *[3] | ..... | 61 | 72.3 | 3.79 | |
| Gorin | ..... | ..... | ..... | 4.71 | |
| Halfway | 93 | 52 | 75.3 | 3.47 | |
| Harrisonville† | 97 | 55 | 75.6 | 4.10 | |
| Hermann† | ..... | ..... | ..... | 0.84 | |
| Houston | 94 | 52 | 74.8 | 5.07 | |
| Houstonia | ..... | ..... | ..... | 1.97 | |
| Irena | ..... | ..... | ..... | 1.83 | |
| Ironton† | 96 | 52 | 74.8 | 3.50 | |
| Jefferson City† | 103 | 51 | 77.8 | 1.67 | |
| Kidder | 93 | 50 | 74.2 | 5.26 | |
| Lamar† | 98 | 55 | 77.6 | 2.53 | |
| Lamonte | ..... | ..... | ..... | 0.70 | |
| Lebanon | 92 | 59 | 75.8 | 1.95 | |
| Lexington | 97 | 53 | 76.7 | 5.51 | |
| Liberty | 93 | 54 | 75 3 | 4.82 | |
| Louisiana | 100 | 55 | 76.1 | 1.34 | |
| McCune *†[1] | 97 | 61 | 75.8 | 2.34 | |
| Marblehill | 96 | 52 | 75.0 | 3.49 | |
| Marshall† | 96 | 52 | 75.5 | 1.49 | |
| Maryville | 101 | 50 | 75.5 | 1.87 | |
| Mexico† | 100 | 56 | 77.2 | 0.72 | |
| Miami | ..... | ..... | ..... | 2.57 | |
| Mineralspring | 89 | 53 | 72.4 | 6.74 | |
| Montreal | 95 | 52 | 75.0 | 0.69 | |
| Mount Vernon | 99 | 56 | 78.2 | 5.86 | |
| Neosho | 94 | 52 | 75.1 | 3.38 | |
| Nevada | 98 | 53 | 75.0 | 0.41 | |
| New Haven | 97 | 58 | 77.2 | 1.64 | |
| New Madrid | 99 | 60 | 80.0 | 6.82 | |
| New Palestine | 93 | 58 | 76.6 | 1.65 | |
| Oakfield | 96 | 58 | 77.0 | 1.63 | |
| Olden† | 95 | 53 | 74.6 | 3.96 | |
| Oregon *a | 99 | 51 | 77.4 | 1.82 | |
| Oregon *b | 100 | 54 | 78.5 | 1.96 | |
| Osceola† | .... | ..... | ..... | 1.55 | |
| Oto | ..... | ..... | ..... | 7.20 | |
| Palmyra *[5] | 98 | 60 | 77.4 | 0.90 | |
| Phillipsburg *†[1] | 94 | 63 | 74.4 | 1.32 | |
| Pickering *[5] | ..... | 50 | 72.3 | 3.12 | |
| Platte River | 94 | 55 | 75.6 | 4.46 | |
| Poplarbluff | 95 | 58 | 78.5 | 3.67 | |
| Potosi | 90 | 44 | 67.4 | 4.26 | |
| Princeton | 102 | 52 | 77.6 | 3.61 | |
| Rhineland | 98 | 54 | 76.0 | 1.66 | |
| Richmond | 95 | 57 | 76.8 | 4.87 | |
| Rolla | ..... | ..... | ..... | 2.54 | |
| St. Charles | 96 | 60 | 77.3 | 1.91 | |
| St. Joseph | ..... | ..... | ..... | 5.26 | |
| Sarcoxie *[3] | 95 | 64 | 74.2 | 3.67 | |
| Sedalia | 97 | 53 | 76.8 | 1.23 | |
| Seymour | 90 | 53 | 73.6 | 5.96 | |
| Shelbina | ..... | ..... | ..... | 0.50 | |
| Sikeston | 96 | 57 | 77.0 | 2.70 | |
| Steffenville | 97 | 53 | 75.0 | 1.91 | |
| Stellada† | 93 | 55 | 74.8 | 0.80 | |
| Sublett | 95 | 51 | 74.2 | 4.27 | |
| Unionville | 97 | 51 | 76.2 | 5.32 | |
| Vichy | 98 | 55 | 77.2 | 0.99 | |
| Warrenton | 99 | 56 | 76.6 | 1.09 | |
| Wheatland | .... | ..... | ..... | 1.96 | |
| Willow Springs | 94 | 49 | 73.9 | 5.04[b] | |
| Zeitonia | 97 | 57 | 77.1 | 4.86 | |
| *Montana.* | | | | | |
| Adel | 90 | 31 | 58.7 | 0.25 | |
| Billings | 96 | 46 | 71.0 | 1.07 | |
| Boulder | 91* | 41* | 66.4* | 0.38 | |
| Bozeman† | 92 | 44 | 68.2 | 0.47 | |
| Butte | 90 | 43 | 66.2 | 0.45 | |
| Castle | 87 | 35 | 60.0 | 0.41 | |
| Chinook† | 97 | 43 | 69.7 | 0.47 | |
| Columbia Falls | 92 | 38 | 66.1 | 1.38 | |
| Crow Agency | 96 | 47 | 70.3 | 0.51 | |

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *Montana*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| Dearborn Canyon | 92 | 40 | 65.8 | 1.05 | |
| Dupuyer | 94 | 38 | 65.6 | ..... | |
| Fort Benton | 98 | 45 | 71.9 | 0.30 | |
| Fort Keogh † | 102 | 48 | 74.1 | 0.47 | |
| Fort Logan | 94 | 41 | 64.9 | 0.49 | |
| Glendive † | 105 | 45 | 74.0 | 0.22 | |
| Glenwood | 92 | 39 | 65.0 | 0.73 | |
| Greatfalls † | 91 | 48 | 69.3 | 1.29 | |
| Kalispell | 96 | 40 | 70.5 | 1.10 | |
| Kipp † | 92 | 38 | 62.0 | 1.30 | |
| Livingston † | 94 | 44 | 68.8 | 1.26 | |
| Manhattan † | 93 | 37 | 64.1 | 0.46 | |
| Martinsdale † | 92 | 38 | 66.4 | 0.24 | |
| Marysville † | 89 | 40 | 64.4 | 0.97 | |
| Missoula | ..... | 42 | ... | 0.29 | |
| Parrot | 95 | 43 | 67.8 | 0.42 | |
| Poplar | 100 | 45 | 70.7 | 0.09 | |
| Radersburg | ..... | 40 | ..... | 0.50 | |
| St. Pauls † | 93 | 40 | 69.0 | 0.81 | |
| Troy | 100 | 39 | 67.6 | 1.06 | |
| Utica | 95 | 41 | 67.3 | 0.67 | |
| Wibaux | 93[c] | 42[c] | 67.3[c] | 0.25 | |
| Yale | 95 | 40 | 66.8 | 0.56 | |
| *Nebraska.* | | | | | |
| Agee [*1] | 99 | 52 | 72.1 | 2.72 | |
| Albion | 97 | 46 | 71.0 | 1.47 | |
| Alliance | ..... | ..... | ..... | 0.20 | |
| Alma [*1] | 100 | 52 | 76.6 | 2.34 | |
| Ansley † | 103 | 44 | 73.4 | 2.12 | |
| Arapaho [*1] | 100 | 52 | 75.4 | 3.17 | |
| Arborville [*1] | 103 | 50 | 76.4 | 1.99 | |
| Ashland *a* † | 103 | 44 | 76.4 | 2.95 | |
| Ashland *b* [*1] | 107 | 57 | 78.4 | 2.77 | |
| Ashton | ..... | ..... | ..... | 1.76 | |
| Auburn [*†1] | 104 | 50 | 77.6 | 1.55 | |
| Aurora | ..... | ..... | ..... | 1.84 | |
| Bartley | ..... | ..... | ..... | 3.40 | |
| Bassett | ..... | ..... | ..... | 1.49 | |
| Beatrice † | 101 | ..... | ..... | 2.33 | |
| Beaver City † | 105 | 49 | 77.4 | 2.23 | |
| Bellevue | ..... | ..... | ..... | 2.20 | |
| Benedict | ..... | ..... | ..... | 0.96 | |
| Benkelman | ..... | ..... | ..... | 0.90 | |
| Blair | 101 | 52 | 73.4 | 2.22 | |
| Bluehill | ..... | ..... | ..... | 2.14 | |
| Brokenbow | ..... | ..... | ..... | 3.55 | |
| Burchard | ..... | ..... | ..... | 1.55 | |
| Burwell | ..... | ..... | ..... | 4.68 | |
| Callaway † | 98 | 51 | 75.4 | 6.85 | |
| Camp Clarke | 109 | 44 | 75.8 | 1.01 | |
| Central City [*5] | ..... | ..... | ..... | 2.30 | |
| Cody | ..... | ..... | ..... | 0.80 | |
| Columbus † | 96 | 46 | 72.4 | 3.86 | |
| Creighton † | 96 | 44 | 71.2 | 3.40 | |
| Crete | 102 | 46 | 76.0 | 2.76 | |
| Culbertson | ..... | ..... | ..... | 1.34 | |
| Curtis *a* | 102 | 51 | 75.3 | 1.67 | |
| David City | 97 | 49 | 74.2 | 2.80 | |
| Dawson | 103 | 48 | 78.2 | 0.93 | |
| Divide | ..... | ..... | ..... | 2.70 | |
| Eden | ..... | ..... | ..... | 2.16 | |
| Edgar [*1] | 104 | 54 | 71.7 | 2.91 | |
| Ericson [*†1] | 100 | 57 | 77.2 | 2.68 | |
| Ewing † | ..... | ..... | ..... | 5.93 | |
| Fairbury † | 106 | 47 | 77.1 | 1.46 | |
| Fairfield | 102 | ..... | ..... | 3.12 | |
| Fairmont † | 100 | 45 | 74.6 | 4.20 | |
| Fort Robinson | 101 | 46 | 72.8 | 0.05 | |
| Franklin | ..... | ..... | ..... | 0.30 | |
| Fremont † | 99 | 48 | 72.8 | 2.06 | |
| Geneva † | 99 | 45 | 74.7 | 4.97 | |
| Genoa | 100 | 50 | 75.4 | 3.98 | |
| Gering | ..... | ..... | ..... | 0.60 | |
| Gordon | ..... | ..... | ..... | 0.60 | |
| Gothenburg | 100[m] | 46[m] | 72.8[m] | 2.52 | |
| Grand Island *a* | ..... | ..... | ..... | 3.50 | |
| Grand Island *b* | 102 | 46 | 73.0 | 3.47 | |
| Greeley | ..... | ..... | ..... | 1.65 | |
| Haigler | ..... | ..... | ..... | 1.75 | |
| Hartington † | 99 | 48 | 71.2 | 3.04 | |
| Harvard | 97 | 47 | 74.3 | 5.11 | |
| Hastings [*1] | 96 | 59 | 75.5 | 6.55 | |
| Hayes Center | ..... | ..... | ..... | 1.24 | |
| Hay Springs | 102 | 48 | 72.6 | 0.31 | |
| Hebron † | 104 | 44 | 72.2 | 1.76 | |
| Hickman | ..... | ..... | ..... | 2.15 | |
| Holdrege *b* | ..... | ..... | ..... | 1.83 | |
| Hooper [*1] | 98 | 54 | 73.2 | 2.70 | |
| Imperial † | 105 | 49 | 80.0 | 0.88 | |
| Johnstown | ..... | ..... | ..... | 1.71 | |
| Kearney | ..... | ..... | ..... | 2.53 | |
| Kennedy | 99 | 47 | 72.9 | 2.31 | |
| Kimball † | 102 | 45 | 71.0 | 0.45 | |
| Kirkwood [*1] | 100 | 57 | 72.6 | 1.87 | |
| Lexington † | 98 | 43 | 72.2 | 2.51 | |
| Lincoln *b* | 100 | 46 | 75.0 | 3.04 | |
| *Nebraska*—Cont'd. | | | | | |
| Lincoln *d* † | 102 | 50 | 77.4 | 2.53 | |
| Lodgepole † | 103 | 42 | 72.9 | 0.00 | |
| Loup *b* [*1] | 102 | 50 | 72.8 | 2.74 | |
| Lynch [*†5] | 104 | 56 | 72.0 | 2.03 | |
| Lyons | ..... | ..... | ..... | 4.45 | |
| McCook | ..... | ..... | ..... | 0.96 | |
| McCool | ..... | ..... | ..... | 3.85 | |
| Madison | 98 | 46 | 73.4 | 1.61 | |
| Madrid [*5] | 102[l] | 50[l] | 77.2[l] | 1.50 | |
| Marquette | ..... | ..... | ..... | 1.74 | |
| Merriman | ..... | ..... | ..... | 2.00 | |
| Minden *a* | 102 | 47 | 75.0 | 4.23 | |
| Minden *b* | ..... | ..... | ... | 3.95 | |
| Monroe | ..... | ..... | ... | 2.85 | |
| Nebraska City *b* | ..... | ..... | ..... | 0.82 | |
| Nebraska City *c* | 104 | 49 | 77.1 | 0.84 | |
| Nemaha [*1] | 104 | 54 | 78.7 | 0.53 | |
| Nesbit | 98 | 45 | 71.4 | 3.26 | |
| Norfolk *b* | 98 | 46 | 71.6 | 2.01 | |
| Norman | ..... | ..... | ..... | 3.87 | |
| North Loup | 99 | 45 | 74.3 | 1.97 | |
| Oakdale † | 100 | 46 | 72.8 | 2.92 | |
| Odell [*5] | 99 | 60 | 77.8 | 1.50 | |
| O'Neill † | 100 | 47 | 70.3 | 2.33 | |
| Ord | 102 | 44 | 73.6 | 2.04 | |
| Osceola | ..... | ..... | ..... | 2.86 | |
| Ough † | ..... | ..... | ..... | 1.92 | |
| Palmer *b* | ..... | ..... | ..... | 3.65 | |
| Ravenna *a* | 105 | 46 | 75.0 | 1.72 | |
| Redcloud *a* | ..... | ..... | ..... | 0.13 | |
| Redcloud *b* [*1] | 104 | 60 | 78.2 | 0.28 | |
| Republican [*1] | 106 | 56 | 77.2 | 1.39 | |
| Rulo [*1] | 104 | 59 | 78.6 | 0.40 | |
| St. Libory | 101 | 50 | 75.4 | 1.47 | |
| St. Paul | 101 | 52 | 76.2 | 3.80 | |
| Salem [*1] | 98 | 52 | 78.0 | 1.37 | |
| Santee Agency † | 104 | 50 | 74.0 | 2.47 | |
| Sargent | ..... | ..... | ..... | 3.50 | |
| Schuyler | ..... | ..... | ..... | 3.72 | |
| Seneca [*1] | 98 | 48 | 70.1 | 2.55 | |
| Seward [*1] | 98 | 58 | 76.6 | 3.42 | |
| Spragg | ..... | ..... | ..... | 3.30 | |
| Springview | 98 | 46 | 72.0 | 1.91 | |
| Stanton | ..... | ..... | ..... | 1.31 | |
| State Farm | 102[l] | 43 | 75.2[l] | 2.82 | |
| Stockham | ..... | ..... | ..... | 4.90 | |
| Strang [*1] | 96 | 55 | 76.4 | 5.25 | |
| Stratton | ..... | ..... | ..... | 0.71 | |
| Superior [*5] | 102 | 50 | 81.0 | 0.87 | |
| Syracuse | ..... | ..... | ..... | 2.06 | |
| Tablerock | 102 | 49 | 79.8 | 1.65 | |
| Tecumseh *b* † | 105 | 47 | 78.2 | 1.55 | |
| Tekamah | 102 | 46 | 73.1 | 4.60 | |
| Thedford [*1] | 96 | 54 | 70.7 | 3.30 | |
| Turlington † | 104 | 52 | 78.2 | 1.77 | |
| Valentine † | 100 | 50 | 72.0 | 3.62 | |
| Valparaiso | ..... | ..... | ..... | 1.54 | |
| Wakefield | 100 | 48 | 72.5 | 1.67 | |
| Wauneta | ..... | ..... | ..... | 1.14 | |
| Weeping Water [*1] | 99 | 43 | 73.4 | 1.91 | |
| Westpoint † | 99 | 49 | 74.0 | 3.88 | |
| Whitman | ..... | ..... | ..... | 0.05 | |
| Wilber [*1] | 96 | 58 | 76.2 | 4.01 | |
| Willard | ..... | ..... | ..... | 3.46 | |
| Wilsonville [*1] | 100 | 50 | 76.5 | 2.61 | |
| Wisner | ..... | ..... | ..... | 1.70 | |
| Wymore [*1] | 101 | 55 | 75.2 | 2.07 | |
| York [*1] | 104 | 54 | 77.2 | 1.39 | |
| *Nevada.* | | | | | |
| Austin | 92 | 44 | 70.8 | 0.56 | |
| Battle Mountain [*1] | 104 | 53 | 78.4 | 0.00 | |
| Beowawe [*1] | 101 | 60 | 77.6 | T. | |
| Blaine | 93 | 29 | 63.4 | 0.11 | |
| Bunkerville | ..... | ..... | ..... | 0.30 | |
| Candelaria | 99 | 50 | 76.0 | 0.98 | |
| Carlin [*1] | 100 | 44 | 69.6 | 0.50 | |
| Carson City | 99 | 37 | 68.9 | 0.25 | |
| Clover Valley | ..... | ..... | ..... | 0.46 | |
| Cranes Ranch | ..... | ..... | ..... | 0.29 | |
| Darrough Ranch | ..... | ..... | ..... | 1.81 | |
| Elko [*1] | 102 | 41 | 73.2 | 0.25 | |
| Elko (near) | 100 | 30 | 65.6 | 0.50 | |
| Ely | 95 | 45 | 69.5 | 2.85 | |
| Empire Ranch | 105 | 48 | 79.6 | 0.13 | |
| Fenelon [*1] | 98 | 50 | 69.3 | 0.16 | |
| Golconda [*1] | 94 | 55 | 74.2 | 0.00 | |
| Halleck [*1] | 107 | 44 | 69.8 | 0.04 | |
| Hawthorne *a* [*1] | 97 | 63 | 80.1 | T. | |
| Hawthorne *b* | 100 | 51 | 76.6 | T. | |
| Hot Springs | ..... | ..... | ..... | 0.00 | |
| Humboldt [*1] | 97 | 50 | 73.1 | 0.00 | |
| Lewers Ranch | 100 | 39 | 70.4 | 0.27 | |
| Los Vegas | 98 | 59 | 78.3 | 0.40 | |
| Lovelocks [*1] | 107 | 45 | 76.0 | 0.00 | |
| McGill | 95 | 38 | 67.1 | 1.11 | |
| Martins | 94 | 38 | 67.3 | 0.54 | |
| *Nevada*—Cont'd. | | | | | |
| Mill City | 105[j] | 56[j] | 74.3[j] | 0.00 | |
| Monitor Mill | 95 | 42 | 69.3 | 1.11 | |
| Osceola | 95 | 60 | 78.4 | 1.13 | |
| Palisade [*1] | 98 | 54 | 75.9 | 0.50 | |
| Palmetto | 96 | 41 | 70.4 | 0.95 | |
| Panaca | 105 | 46 | 74.2 | 2.38 | |
| Reno [*1] | 98 | 52 | 73.4 | 0.10 | |
| Reno State University | 98 | 40 | 69.4 | 0.16 | |
| Ruby Valley | ..... | ..... | ..... | 1.23 | |
| St. Clair | 97 | 45 | 73.8 | 0.00 | |
| St. Thomas | 112 | 67 | 89.2 | 0.00 | |
| San Antonio | 103 | 42 | 77.0 | 3.15 | |
| Silverpeak | 105 | 55 | 79.8 | 0.40 | |
| Sodaville | 105 | 53 | 80.0 | 0.14 | |
| Spring Valley | 104 | 50 | 75.4 | 0.07 | |
| Tecoma [*1] | 111 | 55 | 74.6 | 0.00 | |
| Toano [*1] | 98 | 50 | 70.9 | 0.30 | |
| Tuscarora [*1] | 92 | ..... | ..... | 0.07 | |
| Tybo | 100 | ..... | ..... | 0.75 | |
| Verdi [*1] | 108 | 48 | 73.0 | 0.10 | |
| Wadsworth [*1] | 104 | 50 | 80.0 | 0.07 | |
| Wells | 98 | 32 | 69.6 | 0.48 | |
| *New Hampshire.* | | | | | |
| Alstead [*6] | 84 | 44 | 69.3 | 7.40 | |
| Berlin Mills | 87 | 36 | 66.8 | 4.25 | |
| Bethlehem | 88 | 41 | 66.8 | 7.13 | |
| Brookline [*1] | 94 | 50 | 71.4 | 5.09 | |
| Claremont | 90[e] | 40[e] | 69.0[e] | 4.13 | |
| Concord | 92 | 39 | 69.4 | 4.74 | |
| Durham | 92 | 44 | 69.8 | 5.92 | |
| Hanover | 90 | 41 | 68.6 | 3.94 | |
| Keene | 90 | 39 | 68.8 | 4.87 | |
| Lancaster | ..... | ..... | ..... | 4.58 | |
| Littleton | 84 | 42 | 65.8 | 7.30 | |
| Nashua | 94 | 42 | 71.2 | 6.56 | |
| Newton | 91 | 41 | 69.6 | 6.36 | |
| North Conway | 93 | 43 | 68.7 | 0.70 | |
| Peterboro | 90 | 38 | 68.4 | 6.05 | |
| Plymouth | 95 | 38 | 69.2 | 5.29 | |
| Sanbornton † | 88 | 41 | 67.3 | 3.91 | |
| Stratford | 87 | 44 | 67.2 | 5.53 | |
| Warner | ..... | ..... | ..... | 7.99 | |
| *New Jersey.* | | | | | |
| Asbury Park | 95 | 61 | 75.2 | 6.41 | |
| Barnegat | 92 | 63 | 75.8 | 2.70 | |
| Bayonne | 96 | 56 | 76.6 | 3.57 | |
| Belvidere | 94 | 48 | 73.4 | 8.40 | |
| Bergen Point | 93 | 59 | 75.2 | 3.94 | |
| Beverly † | 95 | 53 | 76.4 | 5.82 | |
| Billingsport [*1] | 91 | 64 | 75.4 | 4.81 | |
| Boonton | 93 | 49 | 73.6 | 4.99 | |
| Bridgeton | 95 | 55 | 78.1 | 4.16 | |
| Camden | 89 | 55 | 74.4 | 9.28 | |
| Cape May C. H. † | 91 | 56 | 75.8 | 4.22 | |
| Charlotteburg | 90 | 42 | 69.8 | 5.91 | |
| Clayton | 96 | 52 | 75.9 | 4.11 | |
| College Farm † | 93 | 55 | 74.9 | 6.44 | |
| Deckertown | 89 | 46 | 71.6 | 7.53 | |
| Dover | 92 | 46 | 72.3 | 5.17 | |
| Egg Harbor City | 94 | 52 | 75.4 | 4.97 | |
| Elizabeth † | 96 | 55 | 75.5 | 3.80 | |
| Englewood | 94 | 50 | 73.8 | 5.88 | |
| Flemington | 93 | 51 | 74.4 | 5.61 | |
| Franklin Furnace | 91 | 45 | 72.0 | 6.16 | |
| Freehold | 91 | 56 | 73.6 | 6.82 | |
| Friesburg | 95 | 54 | 76.4 | 6.40 | |
| Gillette | 91 | 51 | 73.3 | 4.30 | |
| Hammonton | ..... | ..... | ..... | 4.66 | |
| Hanover | 91 | 49 | 72.4 | 5.08 | |
| Hightstown | 92 | 58 | 75.2 | 6.32 | |
| Imlaystown | 98 | 55 | 76.4 | 6.88 | |
| Junction | ..... | ..... | ..... | 4.65 | |
| Lambertville | 97 | 53 | 77.0 | 5.44 | |
| Moorestown | 93 | 54 | 75.6 | 5.04 | |
| Newark *b* † | 94 | 57 | 75.7 | 4.06 | |
| New Brunswick *a* | 95 | 55 | 76.4 | 6.52 | |
| Newton | 91 | 49 | 71.6 | 7.31 | |
| Ocean City | 92 | 55 | 74.7 | 4.51 | |
| Oceanic | 90 | 59 | 74.2 | 6.66 | |
| Paterson | 96 | 52 | 75.2 | 4.57 | |
| Perth Amboy | 95 | 56 | 75.4 | 6.65 | |
| Plainfield | 94 | 53 | 73.9 | 4.91 | |
| Rancocas | ..... | ..... | ..... | 5.25 | |
| Rivervale | 94 | 47 | 73.2 | 5.07 | |
| Roseland | 92 | 48 | 73.0 | 6.40 | |
| Salem [e] | 93 | 59 | 77.2 | 6.72 | |
| Somerville | 96 | 55 | 75.6 | 5.69 | |
| South Orange | 90 | 54 | 73.8 | 3.51 | |
| Staffordville | ..... | ..... | ..... | 3.36 | |
| Toms River | 95 | 51 | 75.4 | 8.58 | |
| Trenton | 97 | 56 | 77.8 | 7.08 | |
| Tuckerton | 94 | 56 | 75.6 | 2.80 | |
| Vineland | 94 | 54 | 73.8 | 3.77 | |
| Woodbine | 92 | 50 | 76.1 | 5.56 | |
| *New Mexico.* | | | | | |
| Albert | 95 | 61 | 76.0 | 1.58 | |

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

| Stations. | Temperature. (Fahrenheit.) | | | Precipitation. | |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Rain and melted snow. | Total depth of snow. |
| *New Mexico*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| Albuquerque† | 94 | 58 | 75.6 | 0.60 | |
| Alma | 92 | 54 | 72.7 | 3.54 | |
| Aztec† | 93 | 53 | 74.0 | 0.89 | |
| Bernalillo† | 98 | 60 | 76.9 | 1.38 | |
| Bluewater | 94 | 37 | 66.0 | 1.00 | |
| Buckmans | 82 | 35 | 59.2 | 1.11 | |
| Clayton | 96 | 57 | 75.0 | 2.30 | |
| Deming*[1] | 100 | 70 | 79.0 | 1.73 | |
| East Lasvegas† | 85 | 50 | 66.4 | 2.97 | |
| Eddy | 96 | 57 | 77.4 | 1.61 | |
| Engle† | 93 | 57 | 74.8 | 4.40 | |
| Espanola | 94 | 52 | 72.2 | 1.32 | |
| Folsom | 91 | 48 | 69.4 | 0.96 | |
| Fort Bayard | 90 | 51 | 71.6 | 2.45 | |
| Fort Union | 87 | 45 | 64.6 | 3.75 | |
| Fort Wingate | 96 | 51 | 71.6 | 2.23 | |
| Gallisteo | 96 | 52 | 71.4 | 2.23 | |
| Gallinas Spring† | 94 | 55 | 74.8 | 0.80 | |
| Gila | 99 | 59 | 78.6 | 2.48 | |
| Laluz | 90 | 56 | 74.2 | 4.77 | |
| Las Vegas Hotsprings | 89 | 48 | 67.7 | 1.81 | |
| Lordsburg*[1] | 98 | 69 | 79.8 | 0.17 | |
| Lower Penasco | 94 | 52 | 70.6 | 4.00 | |
| Missilla Park | 97 | 53 | 75.4 | 2.43 | |
| Monero | 90 | 37 | 64.4 | 0.85 | |
| Puerto de Luna | 96[f] | 54[f] | 75.4[f] | | |
| Raton | 98 | 44 | 68.4 | 3.00 | |
| Rincon† | 96 | 59 | 75.9 | 2.63 | |
| Roswell† | 98 | 54 | 75.0 | 2.99 | |
| White Oaks† | 88 | 50 | 68.9 | 3.54 | |
| Winsors Ranch | 80 | 34 | 57.8 | 3.27 | |
| *New York.* | | | | | |
| Adams | | | | 4.23 | |
| Addison | 91 | 42 | 69.9 | 2.92 | |
| Alden | 90 | 40 | 69.1 | 2.88 | |
| Alfred | 88 | 52 | 71.8 | 6.21 | |
| Angelica† | 89 | 40 | 67.6 | 8.87 | |
| Appleton | 92 | 43 | 70.6 | 2.10 | |
| Arcade | 87 | 41 | 67.6 | 6.20 | |
| Atlanta | | | | 5.76 | |
| Auburn | 90 | 48 | 71.1 | 6.61 | |
| Baldwinsville | 91 | 44 | 70.6 | 5.38 | |
| Bedford | 89 | 47 | 70.8 | 7.91 | |
| Big Sandy*[10] | 86 | 50 | 71.3 | | |
| Bolivar | 88 | 37 | 66.3 | 6.28 | |
| Bouckville | 86 | 41 | 67.6 | 6.39 | |
| Boyds Corners | | | | 7.66 | |
| Brentwood | 94 | 50 | 73.7 | 5.50 | |
| Canajoharie | 88 | 52 | 71.0 | 6.16 | |
| Canton | 92 | 41 | 68.0 | 6.00 | |
| Carmel | 92 | 53 | 73.1 | 12.87 | |
| Carvers Falls | 87 | 43 | 69.0 | 5.35 | |
| Catskill | 89 | 48 | 71.8 | 6.50 | |
| Cedarhill | 91 | 46 | 72.0 | 6.51 | |
| Charlotte*[10] | 92 | 50 | 71.3 | | |
| Chenango Forks | | | | 8.35 | |
| Cherry Creek | | | | 4.46 | |
| Cooperstown† | 87 | 44 | 68.8 | 9.75 | |
| Cortland | 89 | 41 | 68.0 | 9.44 | |
| Dekalb Junction | | | | 4.24 | |
| Dryden | 90 | 39 | 68.8 | 5.47 | |
| Elizabethtown | 89 | 38 | 66.5 | 3.25 | |
| Elmira | 93 | 50 | 73.0 | 4.70 | |
| Fayetteville | | | | 7.42 | |
| Fleming | 90 | 48 | 71.4 | 4.65 | |
| Franklinville | 89 | 38 | 67.6 | 7.99 | |
| Garrattsville | 88 | 38 | 67.7 | 10.14 | |
| Glens Falls | 87 | 52 | 70.1 | 7.02 | |
| Gloversville | 87 | 40 | 68.9 | 6.90 | |
| Greenwich | 88 | 45 | 69.8 | 6.81 | |
| Haskinsville | | | | 4.81 | |
| Hemlock Lake | 88 | 45 | 70.6 | 4.86 | |
| Honeymead Brook | 89 | 47 | 70.2 | 7.35 | |
| Humphrey† | 85 | 45 | 67.2 | 9.21 | |
| Ithaca | 89 | 42 | 70.9 | 4.42 | |
| Jamestown | 87[f] | 46[f] | 68.4[f] | 7.21 | |
| Keene Valley*[1] | 80 | 40 | 65.8 | 4.25 | |
| Kings Station | | | | 9.64 | |
| Lake George | 86 | 46 | 69.2 | 7.37 | |
| Liberty | 86 | 47 | 67.1 | 8.05 | |
| Little Falls | 86 | 49 | 69.8 | 5.24 | |
| Lockport | 90 | 47 | 70.0 | 4.09 | |
| Lowville | 86 | 36 | 67.4 | 3.61 | |
| Lyndonville | | | | 2.54 | |
| Lyons | 90 | 48 | 71.2 | 5.58 | |
| Madison Barracks† | 91 | 49 | 70.4 | 2.65 | |
| Middletown | 89 | 48 | 70.8 | 9.63 | |
| Mohonk Lake | 89 | 54 | 71.2 | 8.19 | |
| Mount Morris | | | | 4.56 | |
| Napoli | | | | 6.99 | |
| Newark Valley | | | | 8.18 | |
| New Lisbon | 86 | 35 | 66.5 | 7.38 | |
| Niagara Falls | | | | 4.21 | |
| North Hammond† | 86 | 48 | 70.2 | 5.06 | |
| North Lake | 80 | 41 | 63.7 | 5.31 | |
| Number Four† | 80 | 37 | 64.4 | 6.56 | |

| Stations. | Temperature. (Fahrenheit.) | | | Precipitation. | |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Rain and melted snow. | Total depth of snow. |
| *New York*—Cont'd. | ° | ° | ° | *Ins.* | *Ins* |
| Nunda | 93 | 42 | 70.3 | 7.29 | |
| Ogdensburg | 83 | 47 | 68.7 | 4.06 | |
| Oneonta | 89 | 40 | 69.0 | 13.05 | |
| Oxford | 89 | 39 | 69.5 | 9.82 | |
| Palermo | 91 | 43 | 69.6 | 2.93 | |
| Penn Yan | 94 | 45 | 71.4 | 4.16 | |
| Perry City | 90 | 37 | 68.8 | 4.68 | |
| Phenix | | | | 5.26 | |
| Pine City | | | | 6.05 | |
| Plattsburg Barracks† | 85 | 47 | 69.2 | 5.82 | |
| Port Jervis | 92 | 47 | 72.0 | 7.08 | |
| Poughkeepsie | 90 | 45 | 71.4 | 8.85 | |
| Primrose | 93 | 50 | 72.4 | 5.82 | |
| Ridgeway | 88 | 47 | 70.5 | 4.88 | |
| Rome | 88 | 43 | 68.4 | 10.98 | |
| Romulus | 90 | 46 | 71.0 | 4.97 | |
| Rose | | | | 7.58 | |
| St. Johnsville | 89 | 42 | 69.7 | 6.11 | |
| Saranac Lake | 84 | 37 | 66.2 | 4.79 | |
| Saratoga Springs | 88 | 44 | 70.4 | 6.39 | |
| Scottsville | | | | 4.16 | |
| Setauket† | 89 | 58 | 72.9 | 6.56 | |
| Sherwood | | | | 6.18 | |
| Skaneateles | | | | 6.17 | |
| South Canisteo | 90 | 39 | 67.0 | 4.45 | |
| South Kortright† | 88 | 35 | 67.4 | 8.21 | |
| Straits Corners | 92 | 43 | 69.4 | 7.15 | |
| Ticonderoga | 88 | 45 | 71.0 | 4.40 | |
| Wappingers Falls | 90 | 48 | 72.7 | 7.75 | |
| Warwick | | | | 6.86 | |
| Watertown | 88 | 42 | 69.8 | 4.52 | |
| Waverly† | 94 | 41 | 71.4 | 5.82 | |
| Wedgwood | 94 | 44 | 70.2 | 4.73 | |
| Westfield | 88 | 50 | 70.0 | 2.46 | |
| Westpoint† | 92 | 52 | 72.4 | 8.38 | |
| Willetspoint | 94 | 58 | 74.4 | 4.94 | |
| *North Carolina.* | | | | | |
| Abshers | 92 | 57 | 75.9 | 10.01 | |
| Beaufort† | 92 | 67 | 79.6 | 10.54 | |
| Biltmore† | 89 | 60 | 73.6 | 6.90 | |
| Bryson City† | | | | 8.60 | |
| Chapel Hill | 96 | 65 | 78.7 | 14.48 | |
| Edenton | 92 | 69 | 80.5 | 6.81 | |
| Experimental Farm | 92 | 66 | 78.6 | 5.32 | |
| Fairbluff† | | | | 16.23 | |
| Fayetteville† | 96 | 64 | 78.2 | 7.46 | |
| Flatrock | 86 | 57 | 71.7 | 11.35 | |
| Goldsboro | 96 | 66 | 80.6 | 9.32 | |
| Greensboro† | 92 | 65 | 77.2 | 3.30 | |
| Henderson† | 93 | 63 | 78.0 | 7.74 | |
| Hendersonville | 89 | 60 | 72.7 | 8.61 | |
| Horse Cove | 86 | 57 | 71.8 | 16.93 | |
| Lenoir*†[1] | 85 | 67 | 74.5 | 5.26 | |
| Linville† | 79 | 52 | 66.0 | 8.48 | |
| Littleton† | 94 | 65 | 78.4 | 4.21 | |
| Louisburg† | 94 | 65 | 79.2 | 8.08 | |
| Lumberton† | 97 | 66 | 80.3 | 7.98 | |
| Mana | | | | 5.40 | |
| Marion | 89 | 60 | 73.6 | 10.84 | |
| Mocksville | 95 | 64 | 78.0 | 7.07 | |
| Moncure† | 97 | 62 | 78.6 | 6.94 | |
| Monroe† | 93 | 63 | 77.6 | 11.65 | |
| Morganton | 92 | 65 | 77.2 | 7.30 | |
| Mountairy | 90 | 59 | 75.0 | 7.17 | |
| Mount Pleasant | 91 | 67 | 77.6 | 8.01 | |
| Murphy† | | | | 9.73 | |
| Newbern | 96 | 67 | 81.2 | 6.05 | |
| Oakridge† | 92 | 63 | 76.7 | 5.32 | |
| Pantego | | | | 8.46 | |
| Patterson | 89 | 60 | 72.5 | | |
| Pittsboro† | 93 | 64 | 77.8 | 9.25 | |
| Rockingham† | 95 | 66 | 79.4 | 7.69 | |
| Roxboro† | 93 | 59[e] | 75.4[e] | 4.53 | |
| Salem† | 93 | 64 | 77.8 | 5.16 | |
| Salisbury† | 95 | 64 | 78.6 | 7.07 | |
| Saxon† | 96 | 62 | 78.1 | 4.64 | |
| Selma | 97 | 60 | 79.6 | 7.79 | |
| Settle | 94 | 63 | 76.4 | 6.45 | |
| Sloan† | 98 | 65 | 78.8 | 7.52 | |
| Soapstone Mount† | 93 | 62 | 76.6 | 8.17 | |
| Southern Pines *a*† | 97 | 59 | 79.2 | 7.44 | |
| Southern Pines *b* | | | | 7.39 | |
| Southport† | 90 | 67 | 80.3 | 7.67 | |
| Tarboro | 98 | 59 | 80.6 | 9.54 | |
| Washwoods | | | | 4.90 | |
| Waynesville† | 88 | 54 | 70.3 | 7.35 | |
| Weldon† | 96 | 69 | 80.4 | 5.08 | |
| *North Dakota.* | | | | | |
| Amenia | 93 | 36 | 66.0 | 2.89 | |
| Aneta | 91 | 34 | 63.6 | 1.60 | |
| Ashley† | 97[d] | 37[d] | 67.3[d] | 0.44 | |
| Berlin | 95 | 33 | 65.1 | 2.60 | |
| Bottineau | 84 | 38 | 62.6 | 2.11 | |
| Buxton | 89 | 38 | 63.3 | 2.85 | |
| Churchs Ferry | 92 | 33 | 65.2 | 3.09 | |
| Coal Harbor | 96 | 39 | 67.2 | 1.90 | |

| Stations. | Temperature. (Fahrenheit.) | | | Precipitation. | |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Rain and melted snow. | Total depth of snow. |
| *North Dakota*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| Devils Lake | 90 | 38 | 64.8 | 1.84 | |
| Dickinson | 104 | 45 | 69.8 | 0.77 | |
| Dunseith | 94 | 36 | 65.8 | 1.50 | |
| Ellendale | 98 | 45 | 66.8 | 1.49 | |
| Fargo† | 91 | 35 | 65.2 | 2.84 | |
| Forman† | 94 | 36 | 66.4 | 2.37 | |
| Fort Berthold | 102 | 38 | 68.4 | 0.04 | |
| Fort Yates† | 98 | | | 1.50 | |
| Fullerton | 96 | 32 | 66.2 | 2.45 | |
| Gallatin† | 92 | 29 | 63.4 | 1.41 | |
| Glenullin | 97 | 40 | 66.2 | T. | |
| Goetz | 94 | 35 | 65.9 | 0.37 | |
| Hamilton | 86 | 36 | 62.5 | 2.02 | |
| Jamestown† | 94 | 35 | 64.9 | 1.60 | |
| Kelso | 92 | 39 | 66.2 | 2.18 | |
| Langdon | 86 | 32 | 61.7 | 1.95 | |
| Larimore† | 90 | 36 | 63.4 | 1.73 | |
| Lisbon | 94 | 39 | 66.1 | 4.56 | |
| McKinney | 94 | 32 | 63.6 | 2.10 | |
| Medora† | 104 | 42 | 70.2 | T | |
| Milton† | | 35 | | 1.70 | |
| Minnewaukon | 90 | 37 | 63.9 | 1.90 | |
| Minot | 90 | 45 | 68.4 | 0.05 | |
| Minto† | 93 | 36 | 64.0 | 2.42 | |
| Napoleon† | 96 | 38 | 66.8 | 1.84 | |
| New England City | 101 | 40 | 69.4 | 0.50 | |
| Oakdale† | 92 | 46 | 67.2 | 1.35 | |
| Pembina | 89 | 38 | 63.8 | 2.15 | |
| Portal | 92 | 40 | 64.0 | 0.74 | |
| Power† | 92 | 34 | 63.6 | | |
| Sheyenne | 95 | 35 | 65.4 | 3.80 | |
| Steele | 95 | 39 | 66.0 | 1.43 | |
| Towner† | 90 | 38 | 65.8 | 1.65 | |
| University | 86 | 40 | 63.7 | 1.35 | |
| Valley City† | 91 | 35 | 65.4 | 1.56 | |
| Wahpeton† | 96 | 38 | 67.5 | 4.05 | |
| Washburn | 102 | 39 | 67.0 | 1.45 | |
| Willow City | 92 | 34 | 64.6 | 0.20 | |
| Woodbridge† | 87 | 32 | 61.4 | 1.52 | |
| *Ohio.* | | | | | |
| Akron | 93 | 47 | 72.1 | 5.65 | |
| Annapolis | 95 | 50 | 73.5 | 3.71 | |
| Ashland | 90 | 50 | 70.8 | 4.74 | |
| Ashtabula | 90 | 50 | 71.4 | 3.20 | |
| Atwater | | | | 5.20 | |
| Bangorville | 95 | 48 | 72.4 | 5.02 | |
| Bellefontaine | 92 | 57 | 72.9 | 4.19 | |
| Bement | | 40 | | 3.89 | |
| Benton Ridge | 93 | 47 | 72.3 | 4.73 | |
| Bethany | 97 | 58 | 76.2 | 5.37 | |
| Bigprairie | 93 | 47 | 72.4 | 3.50 | |
| Binola | | | | 4.38 | |
| Bloomingburg | 91 | 52 | 74.0 | 5.92 | |
| Bowling Green | 96 | 43 | 72.0 | 2.63 | |
| Bucyrus | 98 | 50 | 71.4 | 4.50 | |
| Cambridge | 91 | 46 | 71.6 | 5.17 | |
| Camp Dennison | 94 | 58 | 76.6 | 4.59 | |
| Canal Dover | 93 | 53 | 73.0 | 3.79 | |
| Canton† | 92 | 50 | 72.2 | 6.07 | |
| Carrollton | 92 | 50 | 72.2 | 6.89 | |
| Cedarville | | | | 4.08 | |
| Celina | 95 | 46 | 72.7 | 2.35 | |
| Chillicothe | 93 | 56 | 74.9 | 4.36 | |
| Circleville | 92 | 54 | 75.0 | 4.45 | |
| Clarksville | 92 | 56 | 74.8 | 9.06 | |
| Cleveland *a* | 88 | 51 | 72.0 | 2.14 | |
| Cleveland *b* | 93 | 53 | 72.6 | 2.42 | |
| Clifton | 95 | 50 | 74.2 | 4.35 | |
| Coalton | 94 | 54 | 75.2 | 5.76 | |
| Dayton *a* | 99 | 52 | 75.2 | 2.92 | |
| Dayton *b*† | | | | 3.69 | |
| Defiance | 93 | 48 | 71.9 | 2.01 | |
| Delaware | 94 | 50 | 75.8 | 2.84 | |
| Demos | 90 | 51 | 72.9 | 3.81 | |
| Elyria | 94 | 47 | 73.3 | 5.64 | |
| Findlay | 98 | 40 | 72.4 | 5.03 | |
| Frankfort | 90 | 52 | 73.6 | 4.58 | |
| Garrettsville† | 92 | 44 | 70.1 | 5.42 | |
| Granville | 94 | 47 | 74.8 | 4.73 | |
| Gratiot | 90 | 51 | 73.1 | 6.66 | |
| Greenfield | 92 | 58 | 75.8 | 2.60 | |
| Greenhill | 90 | 50 | 70.6 | 5.06 | |
| Greenville | 87 | 53 | 71.8 | 3.36 | |
| Hackney | 95 | 52 | 76.4 | 4.03 | |
| Hanging Rock | 96 | 57 | 77.3 | 6.48 | |
| Hedges | 93 | 43 | 70.8 | 1.80 | |
| Hillhouse | 91 | 46 | 69.9 | 5.74 | |
| Hillsboro† | 98 | 53 | 76.6 | 2.64 | |
| Hiram | 90 | 49 | 71.5 | 6.03 | |
| Hudson | 94 | 47 | 70.6 | 5.51 | |
| Jacksonboro | 97 | 55 | 75 0 | 4.45 | |
| Kenton | 96 | 48 | 74.0 | 3.66 | |
| Killbuck | 90 | 49 | 71.9 | 3.89 | |
| Lancaster | 91 | 55 | 74.1 | 7.49 | |
| Leipsic | 99 | 48 | 71.2 | 2.72 | |
| Levering | 92 | 42 | 71.3 | 5.06 | |

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *Ohio*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| Logan | 98 | 50 | 76.3 | 4.51 | |
| Lordstown | 92 | 47 | 71.4 | 4.95 | |
| McArthur | 96 | 52 | 74.6 | 4.19 | |
| McConnelsville † | 94 | 51 | 75.2 | 5.35 | |
| Mansfield † | | | | 4.23 | |
| Marietta *b* | 89 | 56 | 74.6 | 5.31 | |
| Marion | 94 | 47 | 73.1 | 4.30 | |
| Medina | 94 | 46 | 72.5 | 5.96 | |
| Milfordton | 94 | 45 | 71.3 | 3.84 | |
| Milligan | 96 | 52 | 75.7 | 4.33 | |
| Millport | 89 | 51 | 70.8 | 7.55 | |
| Montpelier | 93 | 45 | 71.2 | 1.38 | |
| Napoleon | 94 | 43 | 70.5 | 3.09 | |
| Neapolis | | | | 2.24 | |
| New Alexandria | 87 | 53 | 71.6 | 7.21 | |
| New Berlin | 93 | 48 | 72.2 | 6.78 | |
| New Bremen | 98 | 51 | 74.0 | 2.29 | |
| New Holland | 93 | 52 | 75.0 | 4.66 | |
| New Moscow | | | | 3.73 | |
| New Paris | 91 | 53 | 73.2 | 3.20 | |
| New Waterford | 92 | 47 | 72.1 | 6.50 | |
| North Lewisburg | 96 | 47 | 72.4 | 2.70 | |
| North Royalton | 94 | 49 | 73.1 | 4.27 | |
| Norwalk | 95 | 46 | 72.1 | 4.19 | |
| Oberlin | 94 | 45 | 72.9 | 4.22 | |
| Ohio State University | 92 | 50 | 74.0 | 5.36 | |
| Orangeville | 91 | 46 | 70.6 | 5.01 | |
| Ottawa | 93 | 50 | 72.6 | 3.75 | |
| Pataskala † | 92 | 48 | 73.6 | 4.66 | |
| Perry | | | | 6.61 | |
| Philo | 96 | 48 | 74.3 | 5.87 | |
| Plattsburg | 91 | 51 | 72.9 | 4.52 | |
| Point Marblehead *[10] | 98 | 55 | 74.2 | | |
| Pomeroy | 95 | 56 | 76.2 | 4.78 | |
| Portsmouth *a* † | | | | 6.92 | |
| Portsmouth *b* | 92 | 58 | 76.4 | 6.92 | |
| Richwood | 98 | 60 | 76.6 | 3.53 | |
| Ridgeville Corners | | | | 1.64 | |
| Ripley | 91 | 57 | 75.0 | 4.42 | |
| Rittman | 91 | 45 | 70.0 | 3.36 | |
| Rockyridge | 95 | 47 | 73.0 | 6.17 | |
| Rosewood | 91 | 49 | 71.8 | 3.78 | |
| Seaman | 100 | 54 | 77.3 | 3.93 | |
| Shenandoah | 94 | 46 | 71.6 | 5.50 | |
| Sidney *b* | 96 | 52 | 74.3 | 3.63 | |
| Sinking Spring † | 92 | 50 | 74.2 | 2.43 | |
| Somerset † | 92 | 56 | 76.6 | 5.38 | |
| Springboro | | | | 5.33 | |
| Strongsville | | | | 5.64 | |
| Sylvania | 94 | 47 | 70.4 | 1.40 | |
| Thurman | 93 | 56 | 75.4 | 4.81 | |
| Tiffin † | 92 | 51 | 72.6 | 7.42 | |
| Upper Sandusky | 97 | 45 | 73.7 | 3.78 | |
| Urbana | 89 | 51 | 71.2 | 2.96 | |
| Vanceburg | 93 | 55 | 75.4 | 4.35 | |
| Vanwert | 94 | 48 | 73.6 | 3.61 | |
| Vermillion | 92 | 49 | 71.3 | 4.27 | |
| Vickery | 95 | 46 | 73.1 | 3.60 | |
| Walnut | | | | 4.98 | |
| Warren | 92 | 47 | 72.2 | 5.43 | |
| Warsaw | 96 | 45 | 73.7 | 3.99 | |
| Wauseon | 95 | 44 | 72.3 | 2.24 | |
| Waverly | 95 | 55 | 77.0 | 3.96 | |
| Waynesville | 94 | 52 | 74.3 | 6.24 | |
| Wellington | 94 | 45 | 73.6 | 4.50 | |
| Westerville | 90 | 51 | 72.6 | 4.63 | |
| Willoughby | | | | 3.68 | |
| Wooster *b* † | 90 | 46 | 71.1 | 5.53 | |
| Youngstown | 95 | 48 | 73.9 | 4.39 | |
| Zanesville † | | | | 4.44 | |
| *Oklahoma.* | | | | | |
| Anadarko † | 105 | 52 | 80.6 | 1.40 | |
| Arapaho † | 101 | 55 | 78.8 | 1.22 | |
| Burnett † | 97 | 57 | 76.8 | 2.96 | |
| Clifton † | 100 | 53 | 78.0 | 2.82 | |
| Fort Reno † | 101 | 57 | 79.1 | 2.20 | |
| Fort Sill | 100 | 58 | 78.6 | 4.50 | |
| Guthrie | 99 | 61 | 80.6 | 2.81 | |
| Hennessey | | | | 3.25 | |
| Hopeton | 97 | 57 | 78.2 | 4.01 | |
| Jefferson | | | | 6.40 | |
| Kingfisher | 102 | 54 | 79.3 | 4.25 | |
| Mangum † | 102 | 58 | 79.4 | 3.41 | |
| Newkirk | 99 | 60 | 79.2 | 8.97 | |
| Pawhuska | 94 | 60 | 77.2 | 5.30 | |
| Prudence † | 103 | 55 | 76.5 | 3.29 | |
| Putnam | 100 | 60 | 77.1 | 3.85 | |
| Sac and Fox Agency | 100 | 56 | 78.1 | 3.37 | |
| Stillwater † | 96 | 58 | 77.8 | 2.86 | |
| Waukomis | 103 | 57 | 79.2 | 1.32 | |
| *Oregon.* | | | | | |
| Albany *a* | 97 | 48 | 67.5 | 0.28 | |
| Albany *b* | | | | 0.21 | |
| Arlington | 109 | 58 | 77.8 | 0.07 | |
| Ashland *b* | 102 | 44 | 71.4 | 1.94 | |
| Aurora *[1] | 99 | 50 | 72.2 | 1.68 | |
| *Oregon*—Cont'd. | | | | | |
| Aurora (near) | 99 | 42 | 66.4 | T. | |
| Bandon | 71 | 51 | 59.4 | 0.67 | |
| Bay City † | 85 | 45 | 61.3 | 0.87 | |
| Beulah | 105 | 40 | 70.0 | T. | |
| Brownsville | 100 | 54 | 69.6 | 0.40 | |
| Burns | 102 | 41 | 66.5 | T. | |
| Burns (near) | 101 | 35 | 69.6 | T. | |
| Cascade Locks | 96 | 51 | 69.5 | 1.28 | |
| Comstock *[1] | 98 | 49 | 65.2 | 0.43 | |
| Coquille River | | | | 0.95 | |
| Corvallis | 98 | 43 | 66.7 | 0.12 | |
| Dayville † | 105 | 44 | 70.4 | 0.14 | |
| Ella | | | | T. | |
| Fairview | 88 | 48 | 65.3 | 0.91 | |
| Falls City | 94 | 46 | 65.2 | 0.45 | |
| Gardiner | 78 | 50 | 62.1 | 0.92 | |
| Glenora | 100 | 45 | 66.4 | 0.57 | |
| Government Camp | 95 | 35 | 59.8 | 0.80 | |
| Grants Pass *a* † | 103 | 42 | 72.0 | 0.05 | |
| Happy Valley | 102 | 33 | 66.0 | 0.46 | |
| Heppner | 110 | 45 | 70.8 | 0.21 | |
| Hood River (near) *z* | 96 | 47 | 76.8 | 0.09 | |
| Jacksonville | 99 | 47 | 72.2 | 0.18 | |
| Joseph | 94 | 41 | 67.0 | 0.78 | |
| Junction City *[1] | 102 | 52 | 68.6 | 0.13 | |
| Klamath Falls | 100 | 41 | 71.1 | T. | |
| Lafayette *[1] | 103 | 54 | 67.8 | 0.00 | |
| Lagrande [1] | 103[1] | 41[1] | 74.3[1] | 0.64 | |
| Lakeview † | 98 | 40 | 68.5 | | |
| Langlois | 80 | 48 | 65.0 | 0.52 | |
| Lonerock | 106 | 42 | 68.9 | 0.17 | |
| McMinnville | 101 | 46 | 67.6 | 0.79 | |
| Merlin *[1] | 104 | 48 | 73.6 | 0.02 | |
| Monmouth *a* *[1] | 103 | 58 | 70.9 | 0.26 | |
| Monroe | 95 | 49 | 67.4 | 0.62 | |
| Mount Angel † | 100 | 49 | 68.8 | 0.15 | |
| Nehalem | | | | 0.67 | |
| Newberg | 103 | 45 | 62.2 | 0.29 | |
| Newbridge | 103 | 40 | 71.2 | 0.15 | |
| Newport | 80 | 45 | 58.2 | 0.55 | |
| Pendleton | 119 | 47 | 75.0 | 0.06 | |
| Placer | | | | 0.16 | |
| Prineville | 111 | 30 | 69.5 | 0.03 | |
| Riddles *[1] | 102 | 45 | 69.0 | 0.35 | |
| Riverside | 106 | 39 | 73.1 | 0.06 | |
| Salem *b* † | 98 | 46 | 68.2 | 0.06 | |
| Sheridan *[1] | 98 | 50 | 67.0 | 1.08 | |
| Silver Lake | 101 | 31 | 65.4 | 0.05 | |
| Silverton *[1] | 104 | 58 | 70.6 | 0.05 | |
| Siskiyou *[1] | 98 | 48 | 71.6 | 0.00 | |
| Sparta | 100 | 38 | 72.2 | 0.75 | |
| Springfield *[1] | 97 | 50 | 67.7 | 0.21 | |
| Stafford | 102 | 50 | 68.8 | 0.01 | |
| The Dalles † | 103 | 51 | 74.3 | 0.02 | |
| Tillamook Rock | | | | 0.18 | |
| Toledo | 95 | 50 | 64.0 | 0.30 | |
| Umatilla | | | | 0.07 | |
| Vale | 105 | 41 | 71.9 | 0.21 | |
| Vernonia | 105 | 43 | 67.5 | 0.05 | |
| West Fork *[1] | 106 | 50 | 70.4 | 0.00 | |
| Weston | 110 | 37 | 73.1 | 0.40 | |
| Williams | 99 | 42 | 67.7 | 0.03 | |
| *Pennsylvania.* | | | | | |
| Altoona | 91 | 47 | 71.6 | 3.75 | |
| Aqueduct | 97 | 45 | 75.8 | 7.51 | |
| Athens | 95 | 42 | 71.5 | 5.86 | |
| Beaver Dam | | | | 5.62 | |
| Bethlehem | | | | 5.23 | |
| Brookville † | | | | 5.92 | |
| Browers Lock | | | | 6.13 | |
| Cameron | | | | 6.49 | |
| Carlisle | 95 | 49 | 74.2 | 9.62 | |
| Cassandra | 85 | 51 | 69.0 | 6.49 | |
| Cedarrun | | | | 1.22 | |
| Centerhall † | 90 | 48 | 70.8 | 7.37 | |
| Chambersburg † | 92 | 55 | 73.0 | 7.66 | |
| Coatesville | 95 | 50 | 75.6 | 7.03 | |
| Confluence † | 91 | 48 | 71.8 | 8.26 | |
| Coopersburg | 91 | 56 | 74.3 | 5.03 | |
| Davis Island Dam † | | | | 4.99 | |
| Derry Station | 99 | 53 | 73.2 | 6.29 | |
| Doylestown | | | | 7.26 | |
| Driftwood | | | | 4.83 | |
| Duncannon | | | | 9.93 | |
| Dushore | 88 | 37 | 65.8 | 6.08 | |
| Dyberry | 88 | 38 | 68.3 | 5.95 | |
| East Bloomsburg | | | | 2.77 | |
| East Mauch Chunk | 95 | 45 | 72.8 | 7.35 | |
| Easton | 90 | 50 | 73.4 | 5.06 | |
| Ellwood Junction † | | | | 5.51 | |
| Emporium | 88 | 46 | 70.2 | 5.87 | |
| Everett | 92 | 46 | 71.5 | 9.11 | |
| Farrandsville | | | | 5.08 | |
| Forks of Neshaminy *[1] | 90 | 61 | 76.8 | 6.65 | |
| Franklin | 92 | 48 | 71.6 | 5.87 | |
| Frederick | | | | 7.08 | |
| *Pennsylvania*—Cont'd. | | | | | |
| Freeport † | | | | 6.31 | |
| Girardville | | | | 11.32 | |
| Grampian | 88 | 50 | 70.2 | 4.12 | |
| Greensboro † | 94 | 54 | 74.2 | 6.71 | |
| Greenville | 90 | 57 | 71.0 | 5.42 | |
| Hamburg | 95 | 48 | 74.6 | 7.26 | |
| Hawley | 94 | 43 | 71.6 | 4.72 | |
| Hews Island Dam | | | | 4.67 | |
| Hollidaysburg * | 95 | 52 | 72.8 | 4.31 | |
| Huntingdon *a* † | 96 | 46 | 73.4 | 5.18 | |
| Huntingdon *b* | | | | 4.68 | |
| Irwin | | | | 5.47 | |
| Johnstown † | 94 | 52 | 73.8 | 8.37 | |
| Keating | | | | 4.25 | |
| Kennett Square | 92 | 53 | 74.8 | 6.94 | |
| Lansdale | | | | 10.01 | |
| Lawrenceville | 93 | | | 4.79 | |
| Lebanon | 92 | 48 | 73.8 | 10.43 | |
| Leroy † | 90 | 44 | 70.0 | 6.95 | |
| Lewisburg | 93 | 53 | 72.8 | 9.68 | |
| Lock Haven *a* † | 95 | 49 | 74.6 | 5.11 | |
| Lock Haven *b* | | | | 4.90 | |
| Lock No. 4 † | | | | 7.70 | |
| Lycippus | 89 | 53 | 72.7 | 9.13 | |
| Mifflin | | | | 6.90 | |
| Oil City † | | | | 6.73 | |
| Ottsville | | | | 5.70 | |
| Parker † | | | | 6.36 | |
| Philadelphia *b* | 94 | 59 | 76.6 | 8.43 | |
| Point Pleasant | | | | 6.07 | |
| Pottstown | 93 | 54 | 75.8 | 6.84 | |
| Quakertown | 93 | 48 | 74.0 | 5.38 | |
| Reading [2] | | | 74.4 | 7.89 | |
| Reedsville | 93 | 47 | 71.0 | 9.98 | |
| Renovo *a* | | | | 5.95 | |
| Renovo *b* | 93 | 47 | 72.6 | 5.21 | |
| Ridgway † | | | | 7.13 | |
| Saegerstown | 92 | 40 | 69.0 | 8.25 | |
| Salem Corners | 89 | 41 | 69.3 | 6.05 | |
| Scranton | 94 | 43 | 71.6 | 3.72 | |
| Seisholtzville | | | | 5.24 | |
| Selinsgrove | 94 | 49 | 73.3 | 6.86 | |
| Shawmont | | | | 6.18 | |
| Shinglehouse | 88 | 44 | 66.4 | 8.13 | |
| Sinnamahoning | | | | 3.82 | |
| Smethport | 90 | 42 | 68.1 | 6.08 | |
| Smiths Corners | | | | 7.05 | |
| Somerset | 92 | 48 | 70.8 | 9.31 | |
| South Bethlehem | 92 | 55 | 75.2 | | |
| South Eaton | 90 | 46 | 70.5 | 6.30 | |
| State College | 91 | 48 | 70.8 | 4.70 | |
| Sunbury | | | | 3.43 | |
| Swarthmore | 91 | 58 | 75.8 | 4.63 | |
| Swiftwater | 86[1] | 44[1] | 66.9[1] | 5.70 | |
| Towanda | 90 | 45 | 71.0 | 6.84 | |
| Trout Run | | | | 8.02 | |
| Uniontown | 89 | 56 | 73.2 | 6.13 | |
| Warren † | 87 | 44 | 68.6 | 7.73 | |
| Wellsboro † | 92 | 40 | 70.6 | 5.13 | |
| West Chester | 91 | 55 | 74.8 | 4.76 | |
| West Newton † | | | | 6.04 | |
| White Haven | 91 | 43 | 70.0 | 6.15 | |
| Wilkesbarre † | 93 | 46 | 71.6 | 5.16 | |
| Williamsport | 92 | 50 | 72.7 | 4.75 | |
| York † | 93 | 49 | 74.2 | 6.44 | |
| *Rhode Island.* | | | | | |
| Bristol | 84 | 53 | 71.4 | 6.29 | |
| Kingston | 88 | 49 | 71.0 | 6.85 | |
| Lonsdale | | | | 6.77 | |
| Pawtucket | 92 | 50 | 74.0 | 6.63 | |
| Providence *a* | 93 | 54 | 75.2 | 6.00 | |
| Providence *c* | 92 | 52 | 72.9 | 6.27 | |
| *South Carolina.* | | | | | |
| Allendale | 94 | 67 | 78.7 | 17.90 | |
| Anderson † | | | | 9.34 | |
| Batesburg † | 99 | 69 | 80.6 | 5.98 | |
| Blackville † | 94 | 67 | 79.9 | 7.17 | |
| Camden † | | | | 13.55 | |
| Central | 92 | 62 | 77.6 | 12.03 | |
| Cheraw *a* † | 94 | 66 | 80.1 | 6.80 | |
| Cheraw *b* † | | | | 7.07 | |
| Clemson College *a* | 94 | 57 | 78.0 | 7.91 | |
| Conway † | | | | 9.54 | |
| Darlington | | | | 8.12 | |
| Edisto † | | | | 7.52 | |
| Effingham † | | | | 12.12 | |
| Florence | 95 | 66 | 80.6 | 7.20 | |
| Gaffney † | | | | 4.28 | |
| Georgetown † | 92 | 71 | 80.0 | 6.20 | |
| Gillisonville | 97 | 66 | 80.0 | 24.42 | |
| Greenville † | 90 | 65 | 75.6 | 10.10 | |
| Greenwood | 95 | 68 | 79.8 | 7.18 | |
| Holland | 90 | 65 | 76.3 | 7.70 | |
| Kingstree *a* † | 96 | 66 | 80.4 | 11.18 | |
| Kingstree *b* | | | | 11.18 | |
| Little Mountain | 98 | 66 | 78.2 | 5.15 | |

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *South Carolina*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| Longshore † | ..... | 66 | ..... | 6.51 | |
| Mount Carmel † | ..... | ..... | ..... | 8.30 | |
| Pinopolis *[1] | 88 | 72 | 77.3 | 14.85 | |
| Port Royal † | 92 | 71 | 81.1 | 24.68 | |
| St. Georges † | 94 | 68 | 80.0 | 7.59 | |
| St. Matthews † | 97 | 69 | 79.8 | 7.66 | |
| St. Stephens † | ..... | ..... | ..... | 14.66 | |
| Santuck † | 93 | 66 | 77.4 | 6.39 | |
| Shaws Fork | 97 | 63 | 78.1 | 9.63 | |
| Smiths Mills † | ..... | ..... | ..... | 9.74 | |
| Society Hill † | 94 | 67 | 80.0 | 7.73 | |
| Spartanburg | 98 | 66 | 77.9 | 6.82 | |
| Statesburg † | 91 | 67 | 79.0 | 8.36 | |
| Summerville | ..... | ..... | ..... | 11.27 | |
| Trenton | 92 | 69 | 79.0 | 6.32 | |
| Trial | 90 | 66 | 76.6 | 15.20 | |
| Walhalla | 89 | 64 | 75.6 | 7.69 | |
| Walling | 96 | 56 | 78.3 | 5.91 | |
| Winnsboro | 92 | 68 | 78.0 | 7.96 | |
| Yemassee † | 97 | 69 | 81.2 | 10.35 | |
| Yorkville | 93 | 67 | 78.3 | 9.03 | |
| *South Dakota.* | | | | | |
| Aberdeen † | 100 | 40 | 70.3 | 1.61 | |
| Alexandria † | 105 | 46 | 72.2 | 2.44 | |
| Armour | 102 | 47 | 71.2 | 1.48 | |
| Ashcroft † | 101 | 38 | 71.0 | 0.57 | |
| Bowdle | 105[a] | 39[a] | 69.6[a] | 0.28 | |
| Brookings † | 101 | 40 | 69.6 | 2.78 | |
| Canton | 98 | 46 | 70.2 | 1.99 | |
| Centerville | ..... | ..... | ..... | 1.66 | |
| Chamberlain † | 103 | 49 | 73.7 | 1.93 | |
| Chandler | ..... | ..... | ..... | 3.00 | |
| Clark | ..... | ..... | ..... | 2.12 | |
| Desmet | 101 | 42 | 69.0 | 1.62 | |
| Doland | ..... | 42 | ..... | 0.19 | |
| Farmingdale | ..... | ..... | ..... | 0.28 | |
| Flandreau | 103 | 45 | 70.1 | 1.66 | |
| Forestburg † | 104 | 42 | 70.3 | 0.53 | |
| Forest City | 108 | 48 | 73.5 | 0.55 | |
| Fort Meade † | 101 | 48 | 71.6 | 1.50 | |
| Gannvalley | 99 | 48 | 72.2 | 2.10 | |
| Gary | 102 | 47 | 67.5 | 6.14 | |
| Goudyville | 102 | 37 | 69.2 | 2.09 | |
| Harney | 99[b] | 38[c] | 68.5[d] | 0.77 | |
| Highmore | 101 | 47 | 74.4 | 0.62 | |
| Hotch City † | 107 | 43 | 72.8 | 0.47 | |
| Howard † | 104 | 40 | 71.9 | 1.30 | |
| Ipswich | 99 | 40 | 68.5 | 0.88 | |
| Kimball † | 100 | 51 | 71.8 | 1.37 | |
| Leslie † | 106 | 38 | 72.7 | 1.84 | |
| Mellette † | 101 | 40 | 71.2 | 0.73 | |
| Menno † | 103 | 48 | 72.2 | 1.11 | |
| Millbank | 99 | 42 | 68.0 | 2.58 | |
| Mitchell † | 103 | 45 | 70.3 | 1.21 | |
| Montrose | 100 | 46 | 70.4 | 1.24 | |
| Parkston | 102[e] | 40[e] | 68.2[e] | 0.92 | |
| Plankinton † | 102 | 46 | 72.2 | 1.98 | |
| Redfield | 100 | 42 | 70.0 | 0.79 | |
| Rochford | ..... | ..... | ..... | 1.36 | |
| Rosebud | 102 | 45 | 71.6 | 0.98 | |
| Shiloh | 110 | 48 | 70.6 | 0.51 | |
| Silver City | ..... | ..... | ..... | 0.08 | |
| Sioux Falls † | 101 | 43 | 70.4 | 1.67 | |
| Spearfish † | 97 | 48 | 71.2 | 0.05 | |
| Tyndall † | 100 | 48 | 72.0 | 1.91 | |
| Watertown | 94 | 40 | 66.3 | 1.94 | |
| Wentworth † | 103 | 44 | 70.6 | 0.87 | |
| Wessington Springs | 93 | 47 | 68.0 | 1.18 | |
| Whiteswan | 101 | 51 | 73.5 | 1.74 | |
| *Tennessee.* | | | | | |
| Andersonville | 90 | 60 | 75.4 | 5.51 | |
| Arlington | 97 | 62 | 79.2 | 3.58 | |
| Ashwood | 94 | 59 | 77.2 | 3.67 | |
| Benton (near) | 96 | 62 | 77.6 | 2.71 | |
| Bluff City † | ..... | ..... | ..... | 4.56 | |
| Bolivar † | 95 | 62 | 77.2 | 2.18 | |
| Bristol † | 87 | 59 | 73.3 | 4.17 | |
| Brownsville | 97 | 61 | 81.8 | 2.00 | |
| Byrdstown | 91 | 59 | 75.3 | 5.10 | |
| Carthage † | 95 | 62 | 78.6 | 8.32 | |
| Center Point | ..... | ..... | ..... | 2.22 | |
| Clarksville | 92 | 61 | 77.0 | 2.60 | |
| Clinton † | ..... | ..... | ..... | 6.63 | |
| Covington | 98 | 65 | 81.6 | 4.75 | |
| Decatur † | 93 | 61 | 77.6 | 4.27 | |
| Dover | 98 | 59 | 78.4 | 2.54 | |
| Dyersburg | 96 | 59 | 78.5 | 3.44 | |
| Elizabethton † | 94 | 61 | 76.5 | 3.98 | |
| Elk Valley | 93 | 59 | 75.0 | 3.81 | |
| Erasmus | 92 | 50 | 72.1 | 3.84 | |
| Florence † | 91 | 61 | 76.8 | 4.53 | |
| Franklin | 92 | 61 | 76.4 | 4.65 | |
| Grace *[b] | 96 | 58 | 76.9 | 4.00 | |
| Greeneville † | 87 | 60 | 73.8 | 5.51 | |
| Harriman | 92 | 62 | 77.2 | 4.11 | |
| Hohenwald † | 97 | 60 | 77.5 | 3.16 | |
| Jackson † [b] | 93 | 60 | 77.3 | 3.00 | |
| Johnsonville | 97 | 59 | 78.0 | 1.92 | |
| Jonesboro *[1] | 86 | 63 | 73.4 | 5.84 | |
| Kingston † | ..... | ..... | ..... | 5.06 | |
| Lafayette *[b] | 96 | 62 | 77.1 | 6.10 | |
| Lewisburg *[b] | 90 | 59 | 77.1 | 4.35 | |
| Liberty † | 94 | 63 | 77.2 | 4.00 | |
| Lynnville † | 91 | 61 | 76.3 | 3.83 | |
| McKenzie † | 93 | 60 | 77.8 | 5.65 | |
| McMinnville † | 94 | 57 | 76.6 | 4.90 | |
| Madison | 97 | 57 | 78.3 | 4.08 | |
| Maryville *[b] | 91 | 62 | 77.0 | 4.74 | |
| Milan | 98 | 61 | 79.4 | 1.85 | |
| Nashville (near) | 92 | 61 | 77.9 | 3.21 | |
| Newport † | 92 | 59 | 76.0 | 6.12 | |
| Nunnelly | 93 | 59 | 76.2 | 4.37 | |
| Oak Hill | 92 | 58 | 75.6 | 4.07 | |
| Palmetto † | 95 | 59 | 78.4 | 3.44 | |
| Peryear *[b] | 93 | 60 | 77.3 | 3.22 | |
| Pope | 97 | 58 | 78.2 | 3.51 | |
| Rogersville † | 87 | 61 | 73.8 | 5.81 | |
| Rugby | 90 | 55 | 74.0 | 2.52 | |
| Savannah | 99 | 62 | 79.8 | 1.65 | |
| Sewanee † | 91 | 55 | 73.2 | 3.65 | |
| Silverlake | 83 | 55 | 69.2 | 4.77 | |
| Springdale | 95 | 59 | 77.6 | 5.03 | |
| Springfield | 96 | 59 | 77.9 | 2.20 | |
| Sylvia | 94 | 58 | 76.6 | 3.73 | |
| Tazewell | ..... | ..... | ..... | 4.03 | |
| Tellico Plains † | 95 | 61 | 77.8 | 3.72 | |
| Tracy City | 89 | 55 | 72.8 | 4.09 | |
| Trenton | 92 | 57 | 76.2 | 2.07 | |
| Tullahoma † | 91 | 56 | 75.3 | 2.40 | |
| Union City | 93 | 60 | 77.6 | 3.00 | |
| Wildersville | 92 | 62 | 76.8 | 2.34 | |
| Yukon | 93 | 62 | 77.6 | 2.51 | |
| *Texas.* | | | | | |
| Albany *[1] | 96 | 60 | 80.0 | 2.27 | |
| Alvin | ..... | ..... | ..... | 3.37 | |
| Anna | ..... | ..... | ..... | 4.86 | |
| Anson | ..... | ..... | ..... | 1.30 | |
| Arthur City † | ..... | ..... | ..... | 3.65 | |
| Austin *a* | 98 | 65 | 84.0 | 3.91 | |
| Austin *b* *[b] | 97 | 63 | 80.8 | ..... | |
| Ballinger † | 99 | 55 | 80.0 | 0.74 | |
| Beaumont | 100 | 71 | 85.6 | 4.12 | |
| Beeville † | 103 | 69 | 85.6 | 2.50 | |
| Blanco † | 98 | 71 | 86.4 | 2.40 | |
| Boerne *[1] | 99 | 67 | 82.0 | 1.70 | |
| Brazoria † | 92 | 70 | 81.3 | 7.77 | |
| Brenham † | 100 | 69 | 82.9 | 3.74 | |
| Brighton | 97 | 62 | 80.5 | 1.44 | |
| Brownwood | 102 | 64 | 83.8 | 3.55 | |
| Burnet *[1] | 98 | 63 | 80.4 | 1.13 | |
| Childress | 98 | 61 | 79.0 | 2.42 | |
| Coleman | 96[e] | 59[e] | 81.0[e] | 1.54 | |
| College Station [2] | 93 | ..... | 81.6 | 0.21 | |
| Colorado | ..... | ..... | ..... | 4.06 | |
| Columbia † | 92 | 68 | 80.7 | 6.49 | |
| Conroe | 99 | 68 | 82.6 | 4.51 | |
| Corsicana *b* † | 102 | 63 | 84.2 | 1.86 | |
| Cuero † | 98 | 71 | 84.8 | 1.21 | |
| Dallas † | 98 | 61 | 81.5 | 1.66 | |
| Danevang † | 100 | 68 | 82.8 | 4.19 | |
| Dublin † | 99 | 61 | 80.4 | 5.87 | |
| Emory | 97 | 64 | 79.6 | 3.23 | |
| Estelle † | 101 | 60 | 81.9 | 4.27 | |
| Forestburg | 104 | 62 | 81.6 | 4.37 | |
| Fort McIntosh | 103 | 70 | 87.8 | 1.56 | |
| Fort Ringgold † | 105 | 69 | 86.6 | 0.59 | |
| Fort Worth | 102 | 66 | 83.0 | 3.90 | |
| Fredericksburg *† [1] | 98 | 61[c] | 82.1[c] | 1.93 | |
| Fruitland | 101 | 63 | 81.4 | 2.94 | |
| Gainesville | 101[c] | 61[c] | 80.2[d] | 5.81 | |
| Golindo | ..... | ..... | ..... | 1.90 | |
| Grapevine | 100 | 63 | 82.4 | 1.57 | |
| Hale Center † | 97 | 61 | 77.3 | 3.07 | |
| Hallettsville † | 101 | 69 | 84.0 | 1.83 | |
| Haskell | 104 | 58 | 80.4 | 1.43 | |
| Hearne | 99 | 68 | 85.1 | 1.60 | |
| Henrietta | 103 | 61 | 82.0 | 4.80 | |
| Hewitt | ..... | ..... | ..... | 1.40 | |
| Honeygrove | ..... | ..... | ..... | 2.45 | |
| Houston † | 92 | 72 | 81.8 | 5.59 | |
| Hulen | 101 | ..... | ..... | 3.78 | |
| Huntsville † | 97 | 68 | 82.2 | 4.19 | |
| Jacksonville | 96 | 65 | 81.2 | 2.03 | |
| Jasper | 95 | 69 | 81.9 | 7.51 | |
| Junction | ..... | ..... | ..... | 3.86 | |
| Kent | ..... | ..... | ..... | 2.51 | |
| Kerrville | 99 | 56 | 80 3 | 1 13 | |
| Lampasas † | 101 | 55 | 82.0 | 1.75 | |
| Llano *† [b] | 99 | 65 | 81.4 | 0.40 | |
| Longview † | 101 | 67 | 83.0 | 3.01 | |
| Luling † | 100 | 67 | 84.6 | 0.68 | |
| Mann | 101 | 62 | 82.2 | 6.02 | |
| Marathon | 91 | 53 | 74.4 | 0.38 | |
| Marshall | 92 | 70 | 81.6 | 2.32 | |
| Menardville | 99 | 52 | 78.5 | 2.24 | |
| Midland | 100 | 49 | 75.4 | 2.60 | |
| Mount Blanco † | 96 | 54 | 76.6 | 2.13 | |
| New Braunfels † | 102 | 64 | 82.8 | 3.18 | |
| Panter | ..... | ..... | ..... | 2.70 | |
| Paris | 102 | 65 | 81.9 | 3.30 | |
| Point Isabel *[1] | 92 | 80 | 84.4 | T. | |
| Rheinland † | 106 | 60 | 82.6 | 3.24 | |
| Roby | 100 | 57 | 79.1 | 1.99 | |
| Rockport *[1] | 91 | 78 | 83.8 | ..... | |
| Rocksprings | ..... | ..... | ..... | 1.58 | |
| Runge † | 101 | 73 | 86.2 | 2.96 | |
| San Antonio | 100 | 70 | 85.8 | 3.41 | |
| Sanderson | ..... | 56 | ..... | 0.52 | |
| San Marcos *b* † | 99 | 64 | 82.4 | 2.10 | |
| Sugarland | ..... | ..... | ..... | 2.73 | |
| Temple *a* | 99 | 65 | 82.8 | 2.50 | |
| Temple *b* | 102 | 62 | 82.8 | 1.19 | |
| Tyler | 99 | 68[f] | 83.1[f] | 1.19 | |
| Valentine † | 99 | 55 | 76.5 | 1.77 | |
| Victoria | ..... | ..... | ..... | 2.32 | |
| Waco | 101 | 67 | 86.0 | 1.07 | |
| Water Valley | ..... | ..... | ..... | 1.71 | |
| Waxahachie † | 100 | 61 | 83.0 | 2.70 | |
| Weatherford † | 100 | 61 | 81.6 | 1.19 | |
| Wichita Falls † | ..... | ..... | ..... | 2.43 | |
| *Utah.* | | | | | |
| Alpine † | ..... | ..... | ..... | 0.94 | |
| Blue Creek *[1] | 99 | 56 | 76.0 | ..... | |
| Brigham | ..... | ..... | ..... | 0.60 | |
| Cisco † | 105 | 58 | 81.2 | 0.44 | |
| Corinne | 101 | 48 | 77.5 | 0.13 | |
| Ferron | 104 | 56 | 77.4 | 0.07 | |
| Fillmore † | 106 | 42 | 74.2 | 0.06 | |
| Fort Duchesne † | 96 | 48 | 71.4 | 0.66 | |
| Frisco | 96 | 54 | 74.4 | 1.46 | |
| Giles | 105 | 54 | 79.4 | 0.59 | |
| Heber | 96 | 42 | 68.0 | 0.64 | |
| Huntsville | ..... | ..... | ..... | 0.94 | |
| Kelton *[1] | 98 | 60 | 78.3 | 0.00 | |
| Levan † | 93 | 48 | 71.4 | 0.73 | |
| Loa | 94 | 38 | 65.1 | 1.12 | |
| Logan | 96 | 54 | 74.9 | 0.11 | |
| Millville | ..... | ..... | ..... | 0.11 | |
| Minersville | 98 | 48 | 75.2 | 0.94 | |
| Moab † | 101 | 52 | 77.8 | 0.35 | |
| Mount Pleasant † | 109 | 49 | 75.2 | 0.56 | |
| Ogden *a* *[1] | 100 | 65 | 80.4 | 0.30 | |
| Pahreah | 98 | 57 | 76.8 | 1.50 | |
| Parowan † | 95 | 48 | 71.9 | 1.46 | |
| Pinto | 95 | 42 | 69.2 | 0.60 | |
| Promontory *[1] | 105 | 61 | 78.3 | T. | |
| Provo | 105 | 42 | 73.5 | 0.31 | |
| Richfield † | 98 | ..... | ..... | 0.35 | |
| St. George † | 110 | 56 | 82.3 | 0.74 | |
| Scipio † | 97 | 40 | 71.5 | 0.44 | |
| Snowville | 96 | 44 | 71.6 | 0.06 | |
| Soldier Summit | 93 | 35 | 67.5 | 0.10 | |
| Terrace *[1] | 97 | 54 | 72.0 | T. | |
| Tooele † | 94 | 56 | 75.4 | 0.38 | |
| Tropic | 91 | 44 | 67.3 | 0.52 | |
| Woodruff | 90 | 36 | 64.3 | 0.44 | |
| *Vermont.* | | | | | |
| Bennington | 90 | 44 | 70.0 | 8.62 | |
| Brattleboro | 92 | 44 | 70.6 | 4.84 | |
| Burlington † | 88 | 53 | 70.4 | 4.58 | |
| Chelsea † | 85 | 39 | 65.4 | 4.71 | |
| Cornwall | 87 | 44 | 69.5 | 2.39 | |
| Hartland † | 86 | 38 | 66.2 | 5.02 | |
| Jacksonville | 83 | 35 | 64.5 | 5.06 | |
| Norwich | 89 | 37 | 67.2 | 4.01 | |
| St. Johnsbury | 84 | 40 | 66.8 | 5.81 | |
| Vernon *[b] | 93 | 47 | 71.5 | 4.91 | |
| Wells | 87 | 43 | 68.1 | 7.70 | |
| Woodstock | 88 | 37 | 66.0 | 3.82 | |
| *Virginia.* | | | | | |
| Alexandria | 96 | 57 | 78.1 | 6.55 | |
| Ashland † | 94 | 60 | 76.6 | 4.82 | |
| Bedford City | 96 | 62 | 77.2 | 3.67 | |
| Bigstone Gap † | 91 | 58 | 74.8 | 9.72 | |
| Birdsnest *† [1] | 96 | 72 | 80.6 | 3.30 | |
| Blacksburg | 89 | 55 | 70.7 | 3.49 | |
| Buckingham † | 92 | 60 | 76.8 | 3.90 | |
| Burkes Garden | 84 | 51 | 68.2 | 6.79 | |
| Callaville † | 92 | 62 | 77.5 | 2.77 | |
| Charlottesville | 89 | 62 | 75.4 | 10.61 | |
| Christiansburg | ..... | ..... | ..... | 3.13 | |
| Clarksville | ..... | ..... | ..... | 3.42 | |
| Clifton Forge | 92 | 60 | 74.4 | 2.78 | |
| Columbia | 95 | 71 | 81.9 | 1.83 | |
| Dale Enterprise † | 89 | 52 | 71.0 | 9.54 | |
| Danville | ..... | ..... | ..... | 4.97 | |
| Doswell | 99 | 57 | 79.0 | ..... | |
| Dwale | ..... | ..... | ..... | 9.16 | |

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *Virginia*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| Farmville | 98 | 61 | 78.9 | 3 67 | |
| Fredericksburg† | 98 | 61 | 78.7 | 4.44 | |
| Graham's Forge | 87 | 56 | 71.0 | 3.33 | |
| Hampton | 92 | 71 | 82.1 | 4.31 | |
| Hot Springs | 85 | 55 | 70.3 | 8.00 | |
| Lexington† | 90 | 58 | 74 4 | 6.24 | |
| Manassas† | 94 | 56 | 76.8 | 5.92 | |
| Marion | 94[b] | 57[b] | 74.4[b] | 7.15 | |
| Miller School | 93 | 60 | 75.8 | 8.27 | |
| Monterey | 90 | 52 | 67.4 | 7.50 | |
| Petersburg† | 96 | 62 | 78.6 | 2.83 | |
| Quantico | 94 | 62 | 75.0 | | |
| Richmond (near)† | 97 | 64 | 79.6 | 4.74 | |
| Rockymount† | 95 | 61 | 76.6 | 7.48 | |
| Salem† | 93 | 63 | 76.2 | 4.14 | |
| Speers Ferry | | | | 8.59 | |
| Spottsville† | 96 | 62 | 77.2 | 9.90 | |
| Stanardsville† | 92 | 56 | 73.4 | 6.06 | |
| Staunton† | 95 | 59 | 75.5 | 5.16 | |
| Stephens City† | 98[c] | 55[c] | 75.1[c] | 10.40 | |
| Sunbeam† | 94 | 65 | 79.1 | 3.48 | |
| Warrenton | 93 | 62 | 74.2 | 6.42 | |
| Warsaw†[d] | 95 | 60 | 78.3 | 5.04 | |
| Westbrook Farm | 96 | 63 | 79.1 | | |
| Westpoint | 95 | 62 | 78.4 | 3.13 | |
| Woodstock† | 92 | 56 | 74.5 | 7.31 | |
| Wytheville† | 90 | 56 | 72.6 | 5.61 | |
| *Washington.* | | | | | |
| Aberdeen | 96 | 46 | 63.9 | 0.55 | |
| Ashford† | | | | 0.56 | |
| Blaine† | 91 | 37 | 60.5 | 0.78 | |
| Bridgeport† | 107 | 50 | 78.0 | 0.25 | |
| Brinnon | 87 | 50 | 66.0 | 0.05 | |
| Cedar Lake | | | | 0.54 | |
| Centerville† | 108 | 40 | 70.6 | 0.09 | |
| Clearwater | 97 | 47 | 68.6 | 0.67 | |
| Colfax | 103 | 43 | 68.8 | 0.94 | |
| Coupeville† | 92 | 46 | 64.2 | 0.23 | |
| Ellensburg | 96 | 44 | 70.4 | 0.29 | |
| Ellensburg (near) | 110 | 48 | 72.3 | 0.31 | |
| Fort Simcoe† | 105 | 44 | 74.4 | 0.26 | |
| Fort Spokane | 109 | 45 | 72.9 | 1.43 | |
| Grandmound† | 99 | 45 | 67.0 | 0.72 | |
| Hunters† | 94 | 40 | 64.8 | 1.12 | |
| Kennewick† | 115 | 44 | 79.2 | 0.15 | |
| Lacenter | 99 | 46 | 67 2 | 0.51 | |
| Lakeside | 103 | 50 | 75.6 | 1.03 | |
| Lapush | 68 | 48 | 55.7 | 0.79 | |
| Lind | 114 | 45 | 79.3 | 0.69 | |
| Loomis† | 103 | 52 | 79.2 | 0.49 | |
| Madrone† | 89 | 45 | 64.6 | 0.22 | |
| Moxee Valley† | 105 | 47 | 74.6 | 0.13 | |
| New Whatcom | 84 | 44 | 61.8 | 1.03 | |
| Northbend | 91 | 40 | 65.2 | 0.42 | |
| Olga | 80 | 45 | 59.2 | 0.30 | |
| Olympia† | 99 | 45 | 65.3[e] | 0.50 | |
| Orcas Island | 89 | 48 | 63.2 | 0.46 | |
| Pinehill† | 101 | 47 | 71.4 | 0.01 | |
| Pomeroy | 108 | 54 | 79.6 | 0.23 | |
| Port Townsend | 86 | 49 | 62.0 | 0.18 | |
| Pullman† | 102 | 47 | 71.5 | 1.03 | |
| Rosalia† | 101 | 44 | 68.9 | 1.10 | |
| Sedro† | 94 | 41 | 65.2 | 0.87 | |
| Shoalwater Bay*[10] | 82 | 54 | 61.6 | | |
| Silvania | 91 | 43 | 62.4 | 0.16 | |
| Snohomish† | 91 | 46 | 66.1 | 0.18 | |
| Southbend | 95 | 37 | 61.8 | 0.45 | |
| Stampede | 96 | 45 | 66.0 | 1.02 | |
| Sunnyside† | 108 | 50 | 75.0 | 0.07 | |
| Union City† | 93 | 47 | 65.1 | 0.31 | |
| Vancouver | 97 | 48 | 66.8 | 0.18 | |
| Vashon† | 90 | 50 | 65.0 | 0.38 | |
| Waterville | 100 | 48* | 72.2 | 0.91 | |
| *West Virginia.* | | | | | |
| Beckley | 91 | 52 | 68.6 | 5.74 | |
| Beverly† | 92 | 52 | 69.6 | 10.06 | |
| Bluefield | 98 | 51 | 72.6 | 6.15 | |
| Buckhannon *a*† | | | | 8.96 | |
| Buckhannon *b* | 92 | 53 | 73.2 | | |
| Burlington† | 95 | 52 | 73.2 | 8.21 | |
| Charleston† | | | | 7.42 | |
| Dayton† | 91 | 53 | 72.9 | 9.33 | |
| Eastbank | 94 | 60 | 76.9 | 8.53 | |
| Elkhorn† | 88 | 57 | 72.5 | 5.67 | |
| Fairmont† | | | | 7.40 | |
| Glenville† | 88 | 58 | 73.0 | 7.73 | |
| Grafton† | 91 | 54 | 72.6 | 6.85 | |
| Green Sulphur | 91 | 56 | 74.3 | 4.40 | |
| Harpers Ferry | | | | 5.64 | |
| Hinton *a*† | | | | 8.45 | |
| Hinton *b*† | 91 | 60 | 74.4 | | |
| Huntington | 93 | 58 | 76.0 | 6.27 | |
| Kingwood | 90 | 54 | 71.2 | 8.79 | |
| Marlinton† | 84 | 53 | 69.8 | 9.15 | |
| Martinsburg† | 92 | 53 | 74.2 | 7.00 | |
| Morgantown *b*† | 94 | 44 | 75.1 | 7.91 | |

| Stations | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *West Virginia*—Cont'd. | ° | ° | ° | *Ins.* | *Ins.* |
| New Cumberland | 95 | 50 | 74.2 | 5.10 | |
| New Martinsville | 94 | 52 | 75.2 | 7.56 | |
| Nuttallburg | 93 | 45 | 71.9 | 4.85 | |
| Oldfields† | 92 | 56 | 73.6 | 8.07 | |
| Philippi *a* | 92 | 56 | 73.6 | 11.57 | |
| Philippi *b* | | | | 11.41 | |
| Point Pleasant† | 95 | 57 | 77.0 | 6.40 | |
| Powellton | 89 | 58 | 73.2 | 9.55 | |
| Romney | 92 | 54 | 74.2 | 6.68 | |
| Rowlesburg† | | | | 5.70 | |
| Upper Tract | 95 | 54 | 74.2 | 8.88 | |
| Weston *a* | | | | 6.77 | |
| Weston *b**†[1] | 92 | 58 | 73.8 | | |
| Wheeling *a*† | | | | 7.82 | |
| Wheeling *b*† | 94 | 54 | 78.2 | 5.86 | |
| *Wisconsin.* | | | | | |
| Amherst | 92 | 43 | 66.4 | 4.20 | |
| Barron | 94 | 38 | 61.0 | 2.51 | |
| Bayfield | 90 | 46 | 65.8 | 2.20 | |
| Beloit | 92 | 50 | 69.8 | 5.13 | |
| Brodhead | 95 | 46 | 69.4 | 2.62 | |
| Chilton | 94 | 46 | 68.0 | 3.78 | |
| Citypoint | 95 | 45 | 68.6 | 2.50 | |
| Delavan | 93 | 47 | 69.7 | 4.58 | |
| Dodgeville† | 92 | 50 | 68.8 | 4.98 | |
| Easton | 92 | 40 | 67.0 | 1.16 | |
| Eau Claire | 97 | 49 | 70.4 | | |
| Florence† | 92 | 32 | 62.4 | 5.72 | |
| Fond du Lac | 94 | 45 | 68.0 | 2.52 | |
| Grand River Locks | | | | 4.51 | |
| Grantsburg† | 94 | 42 | 66.3 | 2.67 | |
| Gratiot | 90 | 45 | 66.6 | 5.70 | |
| Hartford | | 47 | | 2.07 | |
| Hartland | 92 | 50 | 69.2 | 2.91 | |
| Harvey | 93 | 48 | 69.2 | 3.94 | |
| Hayward | 95 | 39 | 62.3 | 2.60 | |
| Heafford Junction*[1] | 95 | 50 | 68.9 | 1.44 | |
| Hillsboro | 92 | 45 | 67.2 | 4.50 | |
| Knapp | 94 | 40 | 66.1 | 3.53 | |
| Koepenick*†[1] | 90 | 54 | 68.9 | 2.10 | |
| Lancaster† | 94 | 51 | 70.4 | 2.51 | |
| Lincoln | 94 | 51 | 67.3 | 2.94 | |
| Madison† | 87 | 55 | 69.1 | 2.56 | |
| Manitowoc† | 95 | 49 | 66.5 | 2.46 | |
| Meadow Valley† | 94 | 41 | 66.0 | 2.74 | |
| Medford† | 96 | 37 | 66.3 | 2.30 | |
| Menasha | | | | 3.42 | |
| Neillsville | 92 | 42 | 65.4 | 3.33 | |
| New Holstein | 96 | 46 | 65.9 | 2.70 | |
| New London | 95 | 44 | 66.6 | 3.29 | |
| North Crandon | 92 | | | 0.45 | |
| Oconto | 95 | 43 | 66.2 | 3.39 | |
| Osceola† | 95 | 38 | 65.2 | 4.24 | |
| Pepin | 96 | 44 | 69.9 | 1.98 | |
| Pine River† | 93 | 45 | 66.9 | 4.08 | |
| Portage† | 91 | 44 | 66.2 | 4.53 | |
| Port Washington | 95 | 50 | 69.3 | 2.74 | |
| Prairie du Chien | 98 | 48 | 71.6 | 1.83 | |
| Prentice*[1] | 96 | 35 | 61.7 | 1.66 | |
| Racine | 97 | 34 | 70.4 | 3.20 | |
| Shawano | 93 | 44 | 65.5 | 3.80 | |
| Sheboygan*[10] | 94 | 55 | 70.3 | | |
| Spooner | 99 | 38 | 67.5 | 1.97 | |
| Stevens Point† | 93 | 43 | 66.6 | 3.23 | |
| Sturgeon Bay Canal*[10] | 90 | 52 | 65.8 | | |
| Two Rivers*[10] | 93 | 55 | 69.0 | | |
| Valley Junction† | 92 | 38 | 65.4 | 2.66 | |
| Viroqua | 90 | 49 | 68.0 | 5.13 | |
| Watertown† | 90 | 48 | 68.4 | 2.64 | |
| Waukesha† | 91 | 53 | 69.2 | 4.08 | |
| Wausau† | 93 | 44 | 65.4 | 3.94 | |
| Wausaukee | 96 | 40 | 64.6 | 4.20 | |
| Westfield† | 92 | 48 | 68.6 | 3.18 | |
| Whitehall | 93 | 42 | 66.6 | 3.10 | |
| White Mound | 96 | 42 | 68.4 | 6.02 | |
| *Wyoming.* | | | | | |
| Basin | | | | 0.14 | |
| Big Horn Ranch | 87 | 36 | 63.6 | 1.81 | |
| Big Piney | 84 | 33 | 64.4 | 0.23 | |
| Bitter Creek | 105 | 33 | 71.4 | 0.04 | |
| Carbon | 104 | 37 | 72.0 | 0.62 | |
| Cody | | | | 1.74 | |
| Embar | 96 | 40 | 69.7 | 1.61 | |
| Evanston | 88 | 41 | 64.8 | 0.97 | |
| Fort Laramie† | 102 | 45 | 73.2 | 1.13 | |
| Fort Washakie | 90 | 45 | 66.4 | 0.46 | |
| Fort Yellowstone† | 89 | 37 | 63.0 | 2.05 | |
| Greenriver | 99 | 40 | 68.1 | | |
| Laramie | 86 | 38 | 63.1 | 1.16 | |
| Lovell* | 94 | 36 | 67.9 | 1.08 | |
| Lusk† | 100 | 40 | 70.9 | 0.51 | |
| Otto | 93 | 42 | 67.2 | T. | |
| Sheridan | 98 | 43 | 69.2 | 0.62 | |
| Sundance | 98 | 41 | 68.5 | 0.27 | |
| Wamsutter | 100 | 40 | 67.8 | 0.70 | |
| Wheatland | 100 | 45 | 73.2 | 0.48 | |

| Stations. | Temperature. (Fahrenheit.) Maximum. | Minimum. | Mean. | Precipitation. Rain and melted snow. | Total depth of snow. |
|---|---|---|---|---|---|
| *Mexico.* | ° | ° | ° | *Ins.* | *Ins.* |
| Ciudad P. Diaz | 97 | 70 | 85.6 | 2.76 | |
| Leon de Aldamas | 80 | 55 | 67.8 | 7.08 | |
| Puebla | 76 | 51 | 62.6 | 7.72 | |
| Topolobampo*[1] | 93 | 78 | 85.3 | 7.84 | |
| *New Brunswick.* | | | | | |
| St. John | 75 | 51 | 62.3 | 2.78 | |

*Late reports for July, 1898.*

| | | | | | |
|---|---|---|---|---|---|
| *Arizona.* | | | | | |
| Arizona Canal Co. Dam. | 110 | 70 | 88.1 | 0.29 | |
| Walnut Grove | | | | 1.03 | |
| *California.* | | | | | |
| Chino*[6] | 103 | 58 | 78.0 | 0.00 | |
| Coronado | 77 | 62 | 69.2 | 0.00 | |
| Fort Bragg | | | | 0.00 | |
| Glendora | | | | 0.00 | |
| Jolon | | | | 0.00 | |
| Milton (near)*[1] | 109 | 52 | 77.9 | 0.00 | |
| Mount Frazier | | | | 0.00 | |
| Mutah Flat | | | | 0.00 | |
| Stockton | | 42 | 69.4 | | |
| West Palmdale | | | | 0.00 | |
| *Colorado.* | | | | | |
| Cope | 100 | 50 | 72.2 | 3.64 | |
| Lake Moraine | 74 | 39 | 54.8 | 4.76 | |
| *Idaho.* | | | | | |
| Oakley | 103 | 41 | 74.4 | 0.85 | |
| Ola | 100 | 38 | 68.4 | 0.27 | |
| *Illinois.* | | | | | |
| Cordova | 97 | 53 | 76.4 | 1.15 | |
| *Iowa.* | | | | | |
| Galva[4] | 99 | 52 | 74.3 | 1.15 | |
| *Mississippi.* | | | | | |
| Waynesboro | 99 | 65 | 83.9 | 5.89 | |
| *Missouri.* | | | | | |
| Trenton | 95 | 56 | 74.7 | 4.70 | |
| *Nebraska.* | | | | | |
| Bartley | | | | 1.88 | |
| Franklin | 107 | 52 | 76.9 | 1.14 | |
| Wisner | | | | 1.02 | |
| *New Mexico.* | | | | | |
| Monero | 96 | 39 | 64.9 | 4.49 | |
| *North Carolina.* | | | | | |
| Chapelhill | 99 | 60 | 79.8 | 6.38 | |
| *Ohio.* | | | | | |
| Shenandoah | 98 | 42 | 74.4 | 2.42 | |
| *Oregon.* | | | | | |
| Moro | 93[1] | 44[1] | 70.1[1] | 0.04[1] | |
| *Utah.* | | | | | |
| Logan | 96 | 40 | 72.3 | 0.15 | |
| *Washington.* | | | | | |
| Lind | | | | 0.13 | |

## EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

† Weather Bureau instruments.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. + 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.
[7] Mean from hourly readings of thermograph.
[8] Mean of 7 a. m. + 2 p. m. + 9 p. m. ÷ 3.
[9] Mean of sunrise and noon.
[10] Mean of sunrise, noon, sunset, and midnight.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "—" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

## CORRECTIONS.

NOTE.—The following changes have been made in the names of stations:

New Mexico, Las Cruces changed to Mesilla Park.

Washington, Stillaguamish changed to Silvania.

Page 359, line 21 from top, after "centimeters" insert "square."

TABLE III.—*Data furnished by the Canadian Meteorological Service, August, 1898.*

| Stations. | Pressure. | | | Temperature. | | | | Precipitation. | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean not reduced. | Mean reduced. | Departure from normal. | Mean. | Departure from normal. | Mean maximum. | Mean minimum. | Total. | Departure from normal. | Depth of snow. |
| | *Ins.* | *Ins.* | *Ins.* | ° | ° | ° | ° | *Ins.* | *Ins.* | |
| St. Johns, N. F. | 29.80 | 29.94 | −.05 | 62.3 | + 2.5 | 69 0 | 55.6 | 4.17 | ..... | ... |
| Sydney, C. B. I. | 29.93 | 29.97 | +.01 | 65.0 | + 1.7 | 72.7 | 57.3 | 3.23 | −0.67 | .... |
| Halifax, N. S. | 29.88 | 30.01 | +.08 | 67.0 | + 3.4 | 74-1 | 59.9 | 5.66 | +2.10 | .... |
| Grand Manan, N. B. | 29.90 | 29.95 | −.01 | 62.3 | + 0.8 | 69.4 | 55.4 | 3.61 | +0.52 | .... |
| Yarmouth, N. S. | 29.91 | 29.99 | −.01 | 61.0 | + 0.8 | 67.9 | 54.1 | 6.33 | +3.11 | .... |
| Charlottet'n, P. E. I. | 29.90 | 29.94 | −.01 | 66.4 | + 2.1 | 71.5 | 61.4 | 4.54 | +1.14 | .. |
| Chatham, N. B. | 29.90 | 29.92 | −.02 | 65 0 | + 1.8 | 74.2 | 55.8 | 3.73 | −0.41 | .... |
| Father Point, Que. | 29.85 | 29.88 | −.03 | 56.2 | + 0.6 | 65.3 | 47.0 | 3.11 | +0.55 | .... |
| Quebec, Que. | 29.59 | 29.91 | −.04 | 64.6 | + 1.5 | 72.6 | 56.7 | 2.78 | −0.64 | .... |
| Montreal, Que. | 29.72 | 29.92 | −.03 | 67.8 | + 1.4 | 75.3 | 60.2 | 2.56 | +0.39 | .... |
| Rockliffe, Ont. | 29.42 | 29.92 | −.02 | 64.4 | + 2.9 | 74.4 | 54.5 | 4.84 | +1.91 | .... |
| Ottawa, Ont. | 29.62 | 29.97 | ..... | 67.5 | + 2.7 | 77.5 | 57.5 | 3.22 | ..... | .... |
| Kingston, Ont. | 29.63 | 29 94 | −.03 | 69.3 | + 2.3 | 76.6 | 62.0 | 3.47 | +1.48 | .... |
| Toronto, Ont. | 29.58 | 29.95 | −.04 | 70.8 | + 4.8 | 81.8 | 59.8 | 1.08 | −1.50 | .... |
| White River, Ont. | 28.64 | 29.97 | −.01 | 55.6 | − 0.8 | 68.2 | 42.9 | 2.70 | −0.36 | .... |
| Port Stanley, Ont. | 29.35 | 29.97 | −.02 | 68.6 | + 2.7 | 78.1 | 59.1 | 2.26 | −0.13 | ... |
| Saugeen, Ont. | 29.27 | 29.96 | −.02 | 65.7 | + 1.9 | 74.0 | 57.5 | 2.64 | +0.86 | .... |
| Parry Sound, Ont. | 29.26 | 29.93 | −.04 | 65.3 | + 1.8 | 74.8 | 55.8 | 2.82 | +0.14 | .... |
| Port Arthur, Ont. | 29.23 | 29.91 | −.02 | 59.6 | + 0.1 | 69.5 | 49.8 | 2.42 | +0.05 | .... |
| Winnipeg, Man. | 29.08 | 29.88 | −.03 | 63.0 | − 0.4 | 74.8 | 51.1 | 2.15 | −1.31 | .... |
| Minnedosa, Man. | 28.14 | 29.91 | +.02 | 61.0 | + 1.6 | 72.3 | 49.7 | 2.56 | +0.70 | .... |
| Qu'Appelle, Assin. | 27.68 | 29.88 | −.02 | 61.7 | + 0.2 | 74.4 | 49.1 | 3.57 | +2.10 | ... |
| Medicine Hat, Assin. | 27.63 | 29.83 | −.07 | 69.4 | + 3.7 | 83.6 | 55.2 | 2.22 | +1.23 | .... |
| Swift Current, Assin. | 27.39 | 29.88 | −.04 | 65.9 | + 1.9 | 80.4 | 51.4 | 1.79 | +0.05 | .... |
| Calgary, Alberta | ..... | ..... | ..... | 59.0 | ..... | 74.9 | 43.0 | 2.37 | ..... | .... |
| Banff, Alberta | 25.39 | 29.91 | ..... | 62.9 | + 4.1 | 76.8 | 48.9 | 0.85 | −0.98 | .... |
| Edmonton, Alberta | 27.63 | 29.85 | −.06 | 60.0 | + 1.1 | 71.8 | 48.2 | 1.84 | ..... | .... |
| Prince Albert, Sask. | 28.34 | 29.81 | ..... | 62.6 | 0.0 | 76.1 | 49.1 | 1.58 | ..... | .... |
| Battleford, Sask. | 28.20 | 29.89 | ..... | 75.8 | ..... | 90.7 | 60.9 | 0.00 | ..... | .... |
| Kamloops, B. C. | 28.58 | 29.80 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .... |
| Esquimalt, B. C. | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 5.71 | ..... | .... |
| Hamilton, Bermuda. | 30.03 | 30.19 | +.09 | 81.1 | + 1.5 | 87.1 | 75.2 | ..... | ..... | .... |

TABLE IV.—*Mean temperature for each hour of seventy-fifth meridian time, August, 1898.*

| Stations. | 1 a. m. | 2 a. m. | 3 a. m. | 4 a. m. | 5 a. m. | 6 a. m. | 7 a. m. | 8 a. m. | 9 a. m. | 10 a. m. | 11 a. m. | Noon. | 1 p. m. | 2 p. m. | 3 p. m. | 4 p. m. | 5 p. m. | 6 p. m. | 7 p. m. | 8 p. m. | 9 p. m. | 10 p. m. | 11 p. m. | Midnight. | Mean. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bismarck, N Dak. | 62.7 | 61.4 | 60.2 | 59.1 | 57.9 | 57.2 | 56.4 | 57.6 | 60.7 | 65.1 | 69.3 | 72.9 | 75.7 | 77.5 | 79.1 | 80.1 | 80.8 | 80.5 | 79.2 | 77.5 | 73.5 | 69.7 | 67.3 | 64.8 | 68.6 |
| Boston, Mass. | 68.5 | 68.0 | 67.6 | 67.4 | 67.1 | 67.1 | 68.6 | 70.7 | 72.5 | 74.3 | 76.4 | 77.7 | 78.4 | 79.1 | 78.6 | 77.9 | 77.0 | 75.8 | 73.9 | 72.4 | 71.6 | 70.9 | 70.0 | 69.3 | 72.5 |
| Buffalo, N. Y. | 69.1 | 68.6 | 68.1 | 67.5 | 67.1 | 67.1 | 67.9 | 69.3 | 71.1 | 72.4 | 73.5 | 74.4 | 74.6 | 75.3 | 74.9 | 75.1 | 75.3 | 74.6 | 73.7 | 73.0 | 72.5 | 71.5 | 70.4 | 69.8 | 71.5 |
| Chicago, Ill. | 69.8 | 69.2 | 68.6 | 68.1 | 67.5 | 66.7 | 66.9 | 68.4 | 70.3 | 71.7 | 72.1 | 73.0 | 73.3 | 73.9 | 74.9 | 75.3 | 75.6 | 75.3 | 74.5 | 73.4 | 72.5 | 71.7 | 71.1 | 70.5 | 71.4 |
| Cincinnati, Ohio | 73.2 | 72.3 | 71.3 | 70.6 | 69.9 | 69.3 | 68.9 | 71.3 | 74.2 | 76.6 | 79.0 | 80.6 | 82.2 | 83.2 | 83.5 | 83.3 | 82.7 | 82.5 | 81.2 | 79.5 | 78.3 | 77.3 | 75.6 | 74.6 | 76.7 |
| Cleveland, Ohio | 68.6 | 68.4 | 67.8 | 67.2 | 66.5 | 66.7 | 67.6 | 69.0 | 72.3 | 74.1 | 75.2 | 75.5 | 76.1 | 76.5 | 76.3 | 76.2 | 76.1 | 75.2 | 74.4 | 73.8 | 72.3 | 71.0 | 70.1 | 69.7 | 71.9 |
| Detroit, Mich. | 68.2 | 67.1 | 66.6 | 65.9 | 65.3 | 65.0 | 65.4 | 67.9 | 70.3 | 72.3 | 74.1 | 75.2 | 76.9 | 77.9 | 78.7 | 78.6 | 78.4 | 77.8 | 75.7 | 73.9 | 72.0 | 71.3 | 70.3 | 69.4 | 71.8 |
| Dodge, Kans. | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Eastport, Me. | 56.9 | 56.5 | 56.1 | 55.6 | 55.4 | 56.0 | 57.1 | 58.9 | 60.7 | 62.3 | 64.1 | 64.9 | 65.8 | 66.2 | 65.7 | 65.5 | 65.5 | 64.7 | 62.9 | 61.2 | 60.4 | 59.1 | 58.4 | 57.7 | 57.4 | 60.4 |
| Galveston, Tex. | 82.0 | 81.7 | 81.6 | 81.3 | 81.1 | 80.7 | 80.6 | 80.8 | 81.0 | 82.4 | 83.6 | 85.1 | 85.0 | 85.8 | 86.0 | 85.8 | 85.7 | 85.1 | 84.3 | 83.8 | 83.3 | 82.8 | 82.6 | 82.2 | 83.1 |
| Havre, Mont. | 66.2 | 65.1 | 63.2 | 61.8 | 60.4 | 58.5 | 56.9 | 56.2 | 56.9 | 60.6 | 66.2 | 70.7 | 74.9 | 77.9 | 80.7 | 82.2 | 84.7 | 83.9 | 83.7 | 82.4 | 79.6 | 75.2 | 71.2 | 68.5 | 70.3 |
| Kansas City, Mo. | 73.2 | 72.1 | 71.4 | 70.6 | 70.0 | 69.3 | 68.7 | 69.3 | 71.8 | 74.5 | 77.1 | 79.3 | 81.3 | 83.0 | 84.1 | 85.1 | 85.3 | 84.8 | 83.8 | 82.5 | 82.0 | 81.3 | 81.2 | 80.7 | 80.3 | 82.5 |
| Key West, Fla. | 80.2 | 80.2 | 80.2 | 80.0 | 79.4 | 79.5 | 80.0 | 81.6 | 83.2 | 84.3 | 85.1 | 86.2 | 86.3 | 86.5 | 85.6 | 85.2 | 84.3 | 83.5 | 82.5 | 82.2 | 81.1 | 79.9 | 78.7 | 77.9 | 79.5 |
| Memphis, Tenn. | 73.2 | 72.3 | 71.3 | 70.6 | 73.5 | 72.9 | 72.3 | 73.7 | 75.7 | 78.0 | 80.2 | 82.5 | 84.0 | 85.3 | 85.9 | 86.5 | 86.4 | 85.5 | 84.1 | 82.1 | 80.8 | 79.9 | 79.1 | 78 5 | 77.9 | 77.6 | 79.8 |
| New Orleans, La. | 76.7 | 75.9 | 74.9 | 74.2 | 73.5 | 73.1 | 76.1 | 77.3 | 79.2 | 81.0 | 82.5 | 83.7 | 84.4 | 84.3 | 84.2 | 84.3 | 83.3 | 82.1 | 80.8 | 79.9 | 79.1 | 78.5 | 77.9 | 77.6 | 77.4 | 74.0 |
| New York, N. Y. | 77.3 | 76.8 | 76.7 | 76.6 | 76.3 | 76.1 | 76.1 | 77.3 | 79.2 | 81.0 | 82.5 | 83.7 | 84.4 | 84.3 | 84.2 | 79.2 | 78.3 | 77.5 | 76.4 | 75.3 | 74.4 | 74.8 | 74.0 | 73.3 | 76 3 |
| Philadelphia, Pa. | 71.3 | 70.7 | 70.3 | 69.6 | 69.3 | 68.8 | 69.4 | 70.4 | 72.2 | 73.7 | 75.6 | 77.3 | 78.6 | 78.9 | 79.2 | 79.2 | 78.3 | 77.5 | 76.6 | 75.3 | 74.4 | 73.9 | 72.7 | 71.2 | 74.5 |
| Pittsburg, Pa. | 72.5 | 71.9 | 71.3 | 70.4 | 70.3 | 70.2 | 71.9 | 73.5 | 75.6 | 77.8 | 80.0 | 80.5 | 81.9 | 82.5 | 85.1 | 83.2 | 81.9 | 80.5 | 78.6 | 77.1 | 75.7 | 75.2 | 73.9 | 71.3 | 69.0 | 67.1 |
| Portland, Oreg. | 70.3 | 69.7 | 69.1 | 68.9 | 68.3 | 68.0 | 68.6 | 70.3 | 73.3 | 75.7 | 77.7 | 79.5 | 80.0 | 80.4 | 81.5 | 81.1 | 79.6 | 79.2 | 77.9 | 76.2 | 75.7 | 73.8 | 72.6 | 71.9 | 75.8 | 78.0 |
| St. Louis, Mo. | 67.5 | 65.8 | 64.7 | 63.2 | 61.9 | 60.9 | 60.1 | 59.3 | 58.7 | 59.5 | 60.7 | 62.8 | 65.1 | 67.1 | 69.6 | 71.5 | 73.8 | 75.1 | 78.6 | 77.6 | 75.0 | 72.7 | 71.1 | 68.8 | 67.6 | 69.4 |
| St. Paul, Minn. | 74.5 | 73.6 | 72.6 | 72.2 | 71.6 | 71.0 | 70.7 | 72.3 | 74.0 | 76.7 | 79.4 | 81.5 | 82.6 | 83.6 | 84.8 | 85.7 | 87.3 | 87.8 | 87.1 | 86.3 | 83.1 | 79.5 | 77.0 | 75.8 | 77.7 |
| Salt Lake City, Utah | 65.6 | 64.6 | 63.5 | 62.6 | 61.7 | 60.8 | 60.0 | 60.8 | 62.9 | 66.1 | 69.2 | 71.3 | 73.9 | 75.5 | 77.3 | 78.5 | 79.1 | 78.7 | 72.9 | 72.1 | 70.9 | 69.5 | 68.8 | 68.5 | 69.9 |
| San Diego, Cal. | 74.1 | 72.8 | 72.0 | 70.2 | 70.3 | 67.2 | 66.9 | 67.0 | 67.0 | 71.6 | 75.9 | 79.8 | 83.1 | 84.9 | 86.3 | 87.1 | 87.8 | 87.8 | 87.1 | 86.3 | 83.1 | 81.5 | 79.5 | 78.5 | 76.8 | 56.0 |
| San Francisco, Cal. | 68.3 | 68.1 | 67.5 | 67.4 | 67.4 | 67.2 | 66.9 | 67.0 | 67.9 | 68.9 | 71.3 | 72.5 | 73.1 | 73.9 | 74.0 | 73.9 | 74.0 | 74.0 | 73.7 | 72.9 | 72.1 | 70.9 | 69.5 | 68.8 | 68.5 | 78.8 |
| Savannah, Ga. | 54.5 | 53.9 | 53.8 | 53.6 | 53.4 | 53.2 | 53.1 | 53.5 | 52.9 | 52.9 | 54 0 | 55.4 | 57.4 | 58.6 | 59.8 | 60.2 | 60.6 | 60.4 | 59.7 | 59.1 | 57.5 | 56.4 | 55.3 | 54.8 | 56.0 | 76.3 |
| Washington, D. C. | 76.0 | 75.6 | 75.2 | 75.1 | 74.7 | 74.5 | 75.5 | 77.6 | 80.0 | 82.2 | 83.9 | 84.9 | 85.1 | 84.1 | 83.2 | 80.9 | 80.3 | 79.5 | 78.5 | 78.0 | 77.3 | 77.1 | 76.7 | 76.3 | 72.5 | 76.3 |
| | 71.6 | 71.2 | 70.8 | 70.3 | 70.0 | 69.4 | 70.6 | 73.3 | 75.7 | 77.9 | 80.1 | 81.8 | 83.0 | 83.8 | 83.5 | 83.2 | 82.4 | 80.9 | 78.8 | 76.8 | 75.3 | 74.4 | 73.3 | 72.5 | | 78.8 |

TABLE V.—*Mean pressure for each hour of seventy-fifth meridian time, August, 1898.*

| Stations. | 1 a. m. | 2 a. m. | 3 a. m. | 4 a. m. | 5 a. m. | 6 a. m. | 7 a. m. | 8 a. m. | 9 a. m. | 10 a. m. | 11 a. m. | Noon. | 1 p. m. | 2 p. m. | 3 p. m. | 4 p. m. | 5 p. m. | 6 p. m. | 7 p. m. | 8 p. m. | 9 p. m. | 10 p. m. | 11 p. m. | Midnight. | Mean. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bismarck, N. Dak. | 28.207 | .210 | .211 | .213 | .212 | .214 | .222 | .228 | .231 | .234 | .230 | .223 | .213 | .200 | .190 | .178 | .168 | .164 | .161 | .157 | .165 | .179 | .188 | .201 | .200 |
| Boston, Mass. | 29.841 | .838 | .839 | .844 | .849 | .856 | .861 | .864 | .865 | .861 | .856 | .847 | .842 | .834 | .826 | .822 | .822 | .827 | .838 | .844 | .851 | .848 | .845 | .845 | .844 |
| Buffalo, N. Y. | 29.159 | .157 | .157 | .157 | .163 | .173 | .178 | .179 | .178 | .178 | .175 | .168 | .165 | .158 | .147 | .140 | .136 | .134 | .137 | .145 | .155 | .157 | .159 | .163 | .159 |
| Chicago, Ill. | 29.109 | .105 | .107 | .107 | .117 | .128 | .138 | .146 | .144 | .146 | .151 | .148 | .148 | .127 | .115 | .104 | .094 | .090 | .090 | .091 | .107 | .111 | .117 | .109 | .118 |
| Cincinnati, Ohio | 29.357 | .352 | .349 | .350 | .358 | .366 | .378 | .384 | .389 | .392 | .389 | .381 | .368 | .357 | .342 | .335 | .328 | .325 | .326 | .332 | .348 | .357 | .362 | .364 | .358 |
| Cleveland, Ohio | 29.189 | .185 | .183 | .179 | .182 | .188 | .198 | .199 | .206 | .213 | .215 | .207 | .200 | .194 | .181 | .170 | .170 | .167 | .169 | .169 | .177 | .185 | .190 | .191 | .188 |
| Detroit, Mich. | 29.209 | .203 | .201 | .202 | .208 | .210 | .220 | .227 | .235 | .235 | .232 | .225 | .220 | .211 | .199 | .190 | .186 | .185 | .187 | .191 | .205 | .212 | .215 | .216 | .209 |
| Dodge, Kans. | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Eastport, Me. | 29.856 | .854 | .850 | .854 | .859 | .867 | .870 | .873 | .873 | .872 | .867 | .863 | .858 | .852 | .848 | .846 | .846 | .848 | .853 | .862 | .865 | .863 | .861 | .857 | .859 |
| Galveston, Tex. | 29.921 | .917 | .914 | .913 | .915 | .919 | .929 | .936 | .948 | .956 | .962 | .960 | .947 | .934 | .918 | .904 | .892 | .886 | .883 | .890 | .904 | .916 | .923 | .924 | .921 |
| Havre, Mont. | 27.308 | .308 | .307 | .311 | .314 | .318 | .324 | .331 | .337 | .338 | .337 | .332 | .324 | .312 | .302 | .289 | .278 | .270 | .263 | .260 | .265 | .277 | .288 | .294 | .304 |
| Kansas City, Mo. | 28.995 | .997 | .994 | .996 | .996 | .001 | .006 | .011 | .021 | .025 | .025 | .023 | .011 | .999 | .982 | .968 | .959 | .954 | .947 | .949 | .957 | .971 | .978 | .987 | .990 |
| Key West, Fla. | 30.033 | .025 | .017 | .014 | .015 | .022 | .029 | .036 | .041 | .044 | .044 | .039 | .034 | .018 | .007 | .996 | .995 | .998 | .011 | .026 | .035 | .041 | .041 | .038 | .025 |
| Memphis, Tenn. | 29.599 | .596 | .593 | .594 | .596 | .604 | .618 | .631 | .638 | .640 | .643 | .641 | .631 | .617 | .595 | .577 | .569 | .566 | .565 | .570 | .581 | .593 | .599 | .601 | .602 |
| New Orleans, La. | 29.949 | .943 | .940 | .940 | .941 | .948 | .960 | .970 | .980 | .982 | .985 | .982 | .969 | .956 | .945 | .931 | .925 | .925 | .930 | .938 | .944 | .954 | .957 | .958 | .952 |
| New York, N. Y. | 29.675 | .670 | .667 | .668 | .675 | .682 | .693 | .700 | .700 | .700 | .696 | .690 | .679 | .672 | .661 | .658 | .660 | .660 | .663 | .671 | .677 | .683 | .684 | .682 | .678 |
| Philadelphia, Pa. | 29.896 | .886 | .883 | .887 | .894 | .903 | .910 | .919 | .922 | .924 | .921 | .915 | .905 | .893 | .881 | .874 | .873 | .874 | .876 | .884 | .896 | .903 | .906 | .904 | .897 |
| Pittsburg, Pa. | 29.104 | .104 | .104 | .105 | .106 | .111 | .119 | .142 | .142 | .143 | .137 | .135 | .130 | .124 | .117 | .110 | .109 | .105 | .105 | .106 | .106 | .104 | .107 | .109 | .115 |
| Portland, Oreg. | 29.776 | .786 | .795 | .797 | .800 | .803 | .803 | .806 | .814 | .818 | .820 | .821 | .819 | .814 | .804 | .793 | .779 | .762 | .749 | .740 | .737 | .740 | .751 | .768 | .787 |
| St. Louis, Mo. | 29.403 | .398 | .397 | .399 | .403 | .412 | .425 | .434 | .439 | .443 | .445 | .441 | .430 | .420 | .401 | .387 | .377 | .372 | .371 | .377 | .390 | .399 | .405 | .408 | .407 |
| St. Paul, Minn. | 29.050 | .050 | .048 | .052 | .053 | .059 | .073 | .078 | .077 | .077 | .077 | .075 | .065 | .058 | .050 | .038 | .031 | .025 | .022 | .020 | .028 | .041 | .042 | .045 | .051 |
| Salt Lake City, Utah | 25.640 | .643 | .644 | .646 | .649 | .650 | .657 | .664 | .678 | .685 | .687 | .687 | .680 | .666 | .652 | .636 | .616 | .608 | .599 | .595 | .601 | .609 | .621 | .629 | .643 |
| San Diego, Cal. | 29.782 | .782 | .775 | .771 | .765 | .761 | .760 | .765 | .775 | .782 | .789 | .792 | .795 | .786 | .776 | .769 | .756 | .747 | .742 | .739 | .742 | .751 | .765 | .778 | .769 |
| San Francisco, Cal. | 29.776 | .778 | .779 | .776 | .770 | .770 | .772 | .777 | .788 | .796 | .804 | .809 | .812 | .806 | .796 | .787 | .771 | .757 | .748 | .742 | .740 | .747 | .761 | .769 | .776 |
| Savannah, Ga. | 29.969 | .969 | .962 | .948 | .955 | .966 | .982 | .992 | .000 | .005 | .001 | .995 | .981 | .966 | .954 | .952 | .950 | .951 | .960 | .966 | .979 | .984 | .983 | .978 | .973 |
| Washington, D. C. | 29.905 | .901 | .902 | .904 | .912 | .920 | .928 | .935 | .940 | .942 | .938 | .931 | .918 | .902 | .890 | .885 | .884 | .884 | .886 | .895 | .905 | .908 | .909 | .912 | .910 |

TABLE VI.—*Average wind movement for each hour of seventy-fifth meridian time, August, 1898.*

| Stations. | 1 a. m. | 2 a. m. | 3 a. m. | 4 a. m. | 5 a. m. | 6 a. m. | 7 a. m. | 8 a. m. | 9 a. m. | 10 a. m. | 11 a. m. | Noon. | 1 p. m. | 2 p. m. | 3 p. m. | 4 p. m. | 5 p. m. | 6 p. m. | 7 p. m. | 8 p. m. | 9 p. m. | 10 p. m. | 11 p. m. | Midnight. | Mean. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Abilene, Tex. | 5.8 | 5.2 | 5.2 | 5.1 | 5.8 | 5.0 | 5.0 | 5.1 | 6.0 | 7.6 | 8.6 | 8.5 | 8.7 | 8.5 | 9.0 | 9.5 | 9.5 | 9.1 | 9.5 | 9.7 | 8.0 | 6.5 | 6.7 | 6.1 | 7.2 |
| Albany, N. Y. | 4.5 | 4.5 | 4.0 | 3.5 | 3.5 | 3.7 | 4.5 | 6.3 | 6.7 | 7.3 | 8.4 | 8.6 | 9.4 | 10.1 | 9.9 | 9.8 | 8.7 | 6.9 | 5.8 | 5.1 | 5.0 | 4.3 | 4.5 | 4.5 | 6.2 |
| Alpena, Mich. | 5.7 | 5.4 | 5.8 | 5.7 | 5.5 | 5.6 | 5.8 | 5.9 | 5.9 | 6.8 | 7.5 | 8.3 | 8.1 | 8.8 | 9.1 | 10.3 | 8.8 | 7.2 | 6.3 | 5.4 | 4.7 | 4.8 | 5.7 | 5.2 | 6.6 |
| Amarillo, Tex. | 12.6 | 12.3 | 12.0 | 11.2 | 11.2 | 11.7 | 12.1 | 11.2 | 10.2 | 11.8 | 13.5 | 13.0 | 12.2 | 11.9 | 11.6 | 12.7 | 13.3 | 14.7 | 16.0 | 14.0 | 12.3 | 12.9 | 13.3 | 13.0 | 12.5 |
| Atlanta, Ga. | 6.5 | 6.0 | 5.3 | 5.4 | 5.5 | 5.4 | 5.2 | 5.4 | 6.2 | 6.5 | 6.7 | 7.2 | 7.2 | 6.9 | 7.3 | 7.6 | 7.4 | 6.6 | 6.4 | 6.3 | 6.4 | 6.3 | 7.5 | 7.1 | 6.4 |
| Atlantic City, N.J. | 8.5 | 8.2 | 8.0 | 7.5 | 8.0 | 7.6 | 8.0 | 8.7 | 9.4 | 9.5 | 10.0 | 10.5 | 11.3 | 11.5 | 11.9 | 11.0 | 10.5 | 9.6 | 9.3 | 8.7 | 8.2 | 8.3 | 8.6 | 8.4 | 9.2 |
| Augusta, Ga. | 3.9 | 3.8 | 3.7 | 3.7 | 3.5 | 3.1 | 3.2 | 4.3 | 5.0 | 5.5 | 5.9 | 6.4 | 6.9 | 7.5 | 7.2 | 7.2 | 7.1 | 7.2 | 7.0 | 6.3 | 5.6 | 4.6 | 4.5 | 4.9 | 5.3 |
| Baker City, Oreg. | 2.7 | 3.5 | 4.0 | 5.0 | 6.1 | 7.2 | 8.0 | 8.5 | 8.0 | 6.8 | 3.5 | 1.6 | 2.1 | 3.4 | 4.1 | 5.1 | 6.4 | 7.2 | 6.9 | 6.4 | 4.9 | 3.9 | 3.7 | 3.1 | 5.1 |
| Baltimore, Md. | 3.3 | 3.0 | 2.7 | 2.7 | 2.6 | 2.5 | 2.8 | 3.7 | 4.4 | 5.2 | 5.5 | 6.0 | 6.2 | 6.0 | 6.3 | 5.9 | 5.7 | 5.3 | 4.4 | 3.2 | 2.7 | 3.4 | 3.6 | 3.7 | 4.2 |
| Bismarck, N. Dak. | 6.7 | 6.2 | 6.0 | 6.1 | 6.2 | 7.0 | 7.4 | 7.2 | 8.1 | 8.8 | 10.0 | 10.7 | 12.3 | 11.9 | 12.0 | 11.6 | 12.0 | 12.0 | 11.6 | 10.5 | 8.3 | 7.9 | 8.6 | 7.6 | 9.0 |
| Block Island, R. I. | 11.5 | 10.8 | 10.3 | 9.7 | 9.4 | 9.0 | 9.5 | 10.5 | 10.9 | 12.5 | 13.3 | 13.8 | 14.6 | 14.6 | 15.2 | 15.4 | 15.0 | 13.6 | 13.2 | 12.7 | 11.7 | 11.0 | 11.3 | 11.9 | 12.1 |
| Boston, Mass. | 8.8 | 9.0 | 8.2 | 7.9 | 8.3 | 7.3 | 8.2 | 8.5 | 9.1 | 10.0 | 9.9 | 10.5 | 11.0 | 11.6 | 11.5 | 12.3 | 11.0 | 9.8 | 10.0 | 9.3 | 9.5 | 8.7 | 8.4 | 8.5 | 9.5 |
| Buffalo, N. Y. | 11.9 | 12.0 | 11.6 | 11.5 | 11.1 | 10.1 | 10.5 | 10.6 | 11.5 | 12.7 | 14.0 | 14.5 | 15.6 | 15.5 | 15.7 | 14.9 | 15.3 | 14.7 | 13.4 | 12.5 | 11.9 | 12.2 | 11.9 | 11.8 | 12.8 |
| Cairo, Ill. | 3.5 | 3.6 | 4.0 | 3.9 | 3.9 | 3.9 | 4.2 | 4.6 | 4.8 | 5.3 | 5.5 | 5.3 | 5.7 | 5.9 | 6.2 | 6.4 | 6.5 | 5.7 | 4.4 | 4.3 | 3.7 | 4.3 | 4.0 | 4.0 | 4.7 |
| Cape Henry, Va. | 9.8 | 9.7 | 9.4 | 9.2 | 9.0 | 8.9 | 9.3 | 9.7 | 9.5 | 9.8 | 9.6 | 9.4 | 10.7 | 11.6 | 11.9 | 12.0 | 12.0 | 10.6 | 9.3 | 8.9 | 8.6 | 9.4 | 9.3 | 9.3 | 9.9 |
| Carson City, Nev. | 4.8 | 4.1 | 3.0 | 3.0 | 2.2 | 1.9 | 2.2 | 2.2 | 2.0 | 1.5 | 1.5 | 2.9 | 4.0 | 5.8 | 7.4 | 8.8 | 10.8 | 12.8 | 15.2 | 14.7 | 12.6 | 10.8 | 8.5 | 5.6 | 6.2 |
| Charleston, S. C. | 8.1 | 7.8 | 7.8 | 8.2 | 8.3 | 7.7 | 7.8 | 8.1 | 9.8 | 10.5 | 11.3 | 11.7 | 13.2 | 13.8 | 13.8 | 13.6 | 13.8 | 12.4 | 12.0 | 10.3 | 10.1 | 9.7 | 9.2 | 9.1 | 10.3 |
| Charlotte, N. C. | 5.2 | 4.7 | 5.2 | 4.5 | 4.7 | 4.6 | 4.7 | 5.5 | 6.0 | 6.2 | 6.6 | 6.4 | 7.0 | 7.4 | 7.6 | 7.6 | 7.3 | 6.4 | 4.8 | 5.4 | 4.4 | 4.8 | 5.1 | 5.7 | 5.7 |
| Chattanooga, Tenn. | 3.1 | 2.8 | 3.0 | 2.9 | 2.6 | 2.5 | 2.6 | 3.2 | 4.3 | 5.1 | 6.0 | 6.5 | 7.3 | 7.6 | 7.7 | 8.3 | 8.8 | 8.2 | 6.5 | 5.2 | 3.6 | 2.8 | 3.4 | 3.3 | 4.9 |
| Cheyenne, Wyo. | 7.0 | 6.8 | 6.8 | 6.5 | 6.1 | 6.5 | 6.1 | 6.2 | 6.2 | 6.5 | 7.7 | 8.4 | 8.9 | 8.1 | 8.7 | 9.4 | 9.6 | 9.8 | 9.9 | 9.1 | 8.3 | 8.1 | 8.3 | 7.2 | 7.8 |
| Chicago, Ill. | 15.2 | 14.7 | 14.7 | 14.1 | 15.3 | 14.1 | 14.3 | 13.9 | 13.8 | 14.5 | 14.7 | 14.9 | 15.7 | 15.3 | 15.6 | 15.7 | 15.0 | 15.0 | 14.4 | 13.2 | 13.3 | 14.1 | 14.2 | 15.2 | 14.6 |
| Cincinnati, Ohio. | 3.3 | 3.5 | 3.5 | 3.0 | 3.5 | 3.2 | 3.7 | 3.6 | 4.8 | 6.6 | 7.6 | 8.2 | 8.5 | 8.4 | 8.6 | 8.6 | 8.3 | 7.3 | 6.3 | 4.8 | 4.3 | 4.0 | 3.5 | 3.5 | 5.4 |
| Cleveland, Ohio | 10.5 | 10.5 | 10.0 | 10.6 | 10.9 | 11.0 | 11.0 | 11.0 | 11.1 | 10.8 | 11.0 | 11.2 | 12.4 | 12.9 | 12.7 | 12.3 | 11.1 | 10.2 | 9.0 | 7.9 | 8.6 | 9.5 | 10.5 | 10.8 | 10.7 |
| Columbia, Mo. | 5.2 | 4.9 | 5.0 | 4.6 | 4.7 | 4.9 | 5.0 | 4.8 | 5.2 | 6.1 | 6.9 | 7.5 | 7.4 | 7.6 | 7.8 | 7.5 | 8.0 | 7.2 | 5.9 | 4.8 | 4.6 | 4.8 | 4.7 | 5.2 | 5.8 |
| Columbus, Ohio | 4.4 | 4.3 | 4.3 | 4.2 | 4.1 | 3.7 | 3.9 | 4.4 | 5.4 | 5.5 | 7.0 | 7.5 | 7.9 | 7.3 | 7.7 | 7.8 | 7.8 | 6.9 | 6.1 | 4.9 | 5.1 | 5.2 | 4.7 | 4.6 | 5.6 |
| Concordia, Kans. | 6.5 | 6.4 | 5.9 | 5.1 | 4.8 | 5.1 | 4.3 | 4.6 | 6.2 | 6.9 | 7.4 | 7.5 | 7.5 | 8.4 | 8.2 | 8.5 | 8.8 | 8.8 | 8.5 | 7.2 | 6.2 | 6.3 | 6.0 | 6.4 | 6.7 |
| Corpus Christi, Tex. | 10.5 | 9.4 | 8.0 | 6.9 | 5.6 | 4.7 | 4.0 | 4.1 | 5.4 | 6.7 | 7.8 | 9.3 | 11.6 | 13.1 | 15.5 | 16.2 | 17.4 | 17.7 | 16.4 | 15.3 | 14.5 | 13.4 | 12.9 | 11.8 | 10.8 |
| Davenport, Iowa. | 4.7 | 5.1 | 4.5 | 4.6 | 4.1 | 4.4 | 4.8 | 4.8 | 5.4 | 6.3 | 7.6 | 8.1 | 8.7 | 8.3 | 7.9 | 8.0 | 7.8 | 7.1 | 6.0 | 4.9 | 4.5 | 4.2 | 4.2 | 4.5 | 5.9 |
| Denver, Colo. | 7.8 | 6.9 | 7.0 | 6.7 | 6.5 | 6.1 | 6.2 | 6.5 | 5.8 | 4.8 | 4.9 | 5.5 | 6.7 | 7.4 | 8.5 | 9.0 | 8.1 | 8.2 | 8.8 | 10.2 | 9.1 | 7.5 | 7.4 | 7.7 | 7.2 |
| Des Moines, Iowa. | 3.8 | 3.7 | 3.6 | 3.3 | 2.7 | 3.1 | 3.2 | 3.8 | 4.7 | 5.8 | 6.4 | 6.6 | 7.6 | 7.7 | 8.2 | 8.6 | 8.5 | 7.8 | 6.6 | 4.9 | 4.0 | 3.7 | 3.6 | 3.4 | 5.2 |
| Detroit, Mich. | 5.3 | 5.5 | 5.6 | 5.5 | 5.6 | 5.8 | 5.3 | 5.5 | 5.7 | 6.5 | 7.2 | 7.5 | 8.4 | 8.4 | 8.4 | 8.3 | 7.9 | 7.4 | 6.7 | 6.1 | 5.7 | 5.4 | 5.5 | 5.5 | 6.5 |
| Dodge, Kans. | 8.3 | 8.1 | 8.1 | 7.2 | 7.2 | 7.3 | 6.7 | 6.3 | 8.1 | 10.5 | 11.1 | 12.1 | 12.3 | 12.7 | 13.3 | 13.3 | 13.4 | 13.3 | 13.3 | 12.3 | 10.3 | 9.9 | 9.7 | 9.1 | 10.2 |
| Dubuque, Iowa. | 3.8 | 3.6 | 3.8 | 4.3 | 4.1 | 4.1 | 4.2 | 4.9 | 5.7 | 6.1 | 7.0 | 7.5 | 8.1 | 8.2 | 8.0 | 8.2 | 8.5 | 7.8 | 7.0 | 5.8 | 4.9 | 4.5 | 4.6 | 4.0 | 5.8 |
| Duluth, Minn. | 9.1 | 7.9 | 8.3 | 9.8 | 9.9 | 9.7 | 8.7 | 7.9 | 8.2 | 8.8 | 8.8 | 8.3 | 8.9 | 9.3 | 9.8 | 9.7 | 9.5 | 8.7 | 8.1 | 7.5 | 7.7 | 8.5 | 9.1 | 9.1 | 8.8 |
| Eastport, Me. | 5.6 | 5.3 | 4.9 | 4.7 | 4.6 | 4.6 | 4.9 | 5.3 | 5.8 | 6.6 | 6.9 | 7.4 | 8.1 | 8.6 | 8.8 | 8.6 | 7.9 | 7.0 | 6.3 | 5.9 | 5.9 | 6.3 | 6.2 | 6.2 | 6.4 |
| El Paso, Tex. | 8.1 | 7.5 | 7.7 | 7.8 | 8.7 | 8.6 | 8.5 | 8.7 | 8.5 | 8.8 | 9.0 | 9.2 | 9.4 | 9.2 | 9.1 | 8.4 | 9.1 | 9.1 | 9.6 | 8.7 | 7.8 | 9.2 | 9.0 | 8.0 | 8.7 |
| Erie, Pa. | 8.1 | 7.6 | 7.8 | 7.7 | 8.1 | 8.1 | 7.7 | 7.6 | 8.9 | 8.9 | 9.5 | 9.5 | 10.3 | 9.5 | 9.3 | 9.4 | 8.6 | 7.3 | 6.5 | 6.3 | 6.5 | 7.2 | 7.6 | 7.9 | 8.2 |
| Eureka, Cal. | 4.5 | 3.5 | 2.9 | 3.5 | 3.0 | 3.1 | 3.4 | 3.9 | 3.4 | 2.9 | 3.5 | 3.7 | 4.1 | 5.5 | 6.1 | 6.8 | 7.7 | 8.2 | 8.6 | 8.2 | 6.7 | 6.1 | 5.0 | 4.9 | 5.0 |
| Evansville, Ind. | 3.3 | 3.5 | 3.4 | 3.1 | 3.2 | 3.3 | 3.5 | 4.0 | 4.7 | 5.5 | 5.8 | 6.1 | 6.5 | 6.3 | 6.4 | 6.8 | 6.3 | 5.8 | 5.2 | 3.9 | 4.0 | 3.3 | 3.1 | 2.9 | 4.6 |
| Fort Canby, Wash. | 8.9 | 8.0 | 7.8 | 7.9 | 7.4 | 6.9 | 7.1 | 6.9 | 6.7 | 6.8 | 7.3 | 7.5 | 7.8 | 8.9 | 9.4 | 9.5 | 10.2 | 10.3 | 10.0 | 9.5 | 9.4 | 9.4 | 9.2 | 8.6 | 8.4 |
| Fort Smith, Ark. | 3.6 | 4.4 | 4.0 | 4.6 | 4.2 | 4.2 | 3.8 | 4.4 | 5.2 | 4.9 | 4.6 | 4.6 | 4.5 | 5.3 | 5.4 | 5.7 | 5.3 | 5.4 | 4.9 | 4.1 | 3.8 | 4.1 | 3.7 | 3.8 | 4.5 |
| Fresno, Cal. | 8.8 | 8.8 | 8.5 | 8.1 | 7.2 | 6.3 | 5.4 | 5.1 | 4.5 | 4.2 | 4.4 | 4.5 | 4.9 | 4.6 | 4.6 | 5.3 | 5.4 | 5.4 | 5.9 | 6.0 | 6.3 | 6.9 | 7.5 | 8.4 | 6.1 |
| Galveston, Tex. | 4.5 | 4.5 | 4.5 | 4.5 | 4.2 | 4.1 | 4.4 | 4.5 | 4.9 | 4.9 | 5.0 | 5.5 | 5.6 | 6.2 | 5.9 | 5.9 | 6.1 | 6.3 | 5.9 | 5.0 | 4.8 | 4.5 | 4.6 | 4.5 | 5.0 |
| Grand Haven, Mich. | 6.7 | 6.9 | 6.6 | 6.4 | 6.1 | 6.0 | 6.1 | 6.3 | 7.2 | 8.5 | 8.5 | 9.2 | 10.0 | 10.6 | 10.7 | 10.3 | 9.5 | 8.4 | 7.1 | 6.2 | 5.7 | 5.7 | 6.9 | 6.9 | 7.6 |
| Green Bay, Wis. | 4.5 | 4.3 | 4.5 | 4.4 | 4.1 | 4.0 | 4.1 | 4.3 | 5.5 | 6.5 | 6.8 | 7.1 | 7.6 | 7.7 | 7.3 | 7.9 | 7.5 | 7.5 | 6.1 | 5.4 | 5.1 | 5.3 | 5.5 | 5.2 | 5.8 |
| Hannibal, Mo. | 5.8 | 6.2 | 6.3 | 6.3 | 5.7 | 5.9 | 5.7 | 5.8 | 6.9 | 8.3 | 8.8 | 10.0 | 9.8 | 9.7 | 10.3 | 10.5 | 10.6 | 9.4 | 7.6 | 5.7 | 5.9 | 5.8 | 5.8 | 6.0 | 7.4 |
| Harrisburg, Pa. | 3.0 | 3.2 | 3.0 | 3.0 | 3.5 | 3.2 | 3.6 | 4.2 | 5.0 | 5.2 | 6.0 | 6.0 | 6.6 | 7.1 | 7.4 | 7.1 | 6.8 | 6.6 | 5.8 | 4.9 | 4.5 | 4.2 | 4.0 | 3.6 | 4.9 |
| Hatteras, N. C. | 9.5 | 9.4 | 9.0 | 9.1 | 8.4 | 8.1 | 8.0 | 8.4 | 9.7 | 9.4 | 9.9 | 9.7 | 10.8 | 11.4 | 11.6 | 12.3 | 11.4 | 10.9 | 10.2 | 10.3 | 9.5 | 9.0 | 9.5 | 9.3 | 9.8 |
| Havre, Mont. | 6.6 | 5.7 | 6.6 | 6.5 | 6.5 | 5.6 | 6.4 | 6.1 | 6.2 | 7.6 | 8.1 | 8.7 | 9.9 | 9.4 | 9.3 | 9.8 | 9.6 | 10.1 | 9.9 | 10.0 | 9.3 | 8.5 | 7.9 | 7.7 | 8.0 |
| Helena, Mont. | 8.8 | 7.9 | 7.4 | 5.8 | 5.5 | 6.5 | 6.9 | 6.2 | 4.6 | 2.9 | 3.5 | 3.7 | 4.5 | 5.2 | 5.9 | 7.4 | 7.6 | 7.4 | 8.0 | 8.9 | 7.5 | 6.5 | 8.0 | 8.4 | 6.5 |
| Huron, S. Dak. | 9.0 | 8.2 | 7.7 | 7.6 | 7.9 | 7.5 | 7.6 | 7.8 | 8.0 | 9.4 | 10.2 | 10.9 | 11.8 | 12.3 | 13.2 | 13.2 | 12.6 | 12.4 | 11.7 | 11.1 | 10.2 | 10.2 | 10.6 | 9.8 | 10.0 |
| Idaho Falls, Idaho. | 8.0 | 7.1 | 6.5 | 7.1 | 6.6 | 6.1 | 6.2 | 5.5 | 6.1 | 5.8 | 5.6 | 7.2 | 9.6 | 10.7 | 11.4 | 12.0 | 12.8 | 13.8 | 13.5 | 13.0 | 11.5 | 9.0 | 8.2 | 7.4 | 8.8 |
| Independence, Cal. | 8.2 | 7.3 | 6.9 | 5.7 | 5.1 | 5.0 | 5.1 | 5.3 | 4.9 | 4.6 | 5.0 | 5.9 | 6.0 | 7.1 | 9.2 | 10.8 | 11.9 | 12.5 | 12.7 | 12.3 | 10.6 | 9.2 | 9.1 | 8.3 | 7.8 |
| Indianapolis, Ind. | 5.7 | 5.5 | 5.3 | 5.5 | 5.5 | 5.3 | 5.5 | 6.0 | 6.6 | 7.1 | 7.6 | 8.1 | 8.1 | 9.4 | 10.1 | 9.7 | 9.1 | 9.3 | 8.2 | 6.8 | 6.5 | 5.8 | 6.1 | 5.8 | 7.0 |
| Jacksonville, Fla. | 6.3 | 6.3 | 6.3 | 6.3 | 6.3 | 6.1 | 6.1 | 6.5 | 7.8 | 8.7 | 8.7 | 8.5 | 9.9 | 10.4 | 10.4 | 10.7 | 9.5 | 9.0 | 8.7 | 6.8 | 6.1 | 6.2 | 6.4 | 6.3 | 7.7 |
| Jupiter, Fla. | 7.3 | 7.3 | 7.3 | 7.5 | 7.3 | 7.9 | 7.7 | 8.2 | 9.3 | 10.5 | 11.5 | 11.8 | 12.3 | 13.2 | 13.1 | 13.5 | 12.8 | 10.8 | 9.2 | 8.6 | 8.6 | 8.1 | 7.9 | 7.5 | 9.5 |
| Kansas City, Mo. | 7.1 | 6.5 | 6.8 | 6.9 | 6.4 | 6.2 | 5.8 | 6.0 | 6.8 | 7.7 | 8.6 | 8.7 | 9.3 | 9.6 | 9.6 | 9.9 | 9.5 | 8.6 | 7.7 | 6.4 | 6.2 | 6.3 | 6.8 | 7.0 | 7.5 |
| Keokuk, Iowa. | 5.6 | 5.5 | 5.1 | 4.9 | 4.7 | 5.4 | 5.4 | 5.3 | 5.8 | 6.7 | 7.7 | 7.8 | 7.8 | 7.9 | 8.5 | 8.4 | 8.3 | 7.4 | 6.0 | 4.8 | 4.5 | 4.2 | 4.7 | 4.4 | 6.1 |
| Key West, Fla. | 6.2 | 6.0 | 5.8 | 6.2 | 6.2 | 6.2 | 6.3 | 6.8 | 7.9 | 8.4 | 8.7 | 8.9 | 8.7 | 8.4 | 7.9 | 7.5 | 7.6 | 6.7 | 6.2 | 6.5 | 6.3 | 6.3 | 6.5 | 6.5 | 7.0 |
| Kittyhawk, N. C. | 9.9 | 9.9 | 9.7 | 9.7 | 9.3 | 8.9 | 9.0 | 10.4 | 10.9 | 11.0 | 10.9 | 11.2 | 11.8 | 12.3 | 13.1 | 14.8 | 16.2 | 15.7 | 13.7 | 12.5 | 12.1 | 11.2 | 10.9 | 10.3 | 11.5 |
| Knoxville, Tenn. | 3.5 | 3.5 | 3.3 | 3.9 | 3.5 | 3.5 | 3.5 | 3.9 | 4.5 | 5.7 | 6.3 | 6.5 | 7.1 | 7.0 | 7.5 | 7.0 | 6.9 | 6.7 | 6.1 | 4.7 | 3.5 | 4.3 | 3.7 | 3.8 | 5.0 |
| La Crosse, Wis. | 3.6 | 3.6 | 4.1 | 4.1 | 3.9 | 4.3 | 4.7 | 4.8 | 4.5 | 5.1 | 5.4 | 6.5 | 7.0 | 6.9 | 6.9 | 6.8 | 7.1 | 6.9 | 5.9 | 5.0 | 3.9 | 3.5 | 4.2 | 4.3 | 5.1 |
| Lander, Wyo. | 3.4 | 3.3 | 2.6 | 2.5 | 2.3 | 2.1 | 2.2 | 2.4 | 1.8 | 2.0 | 2.8 | 3.1 | 3.4 | 3.7 | 4.8 | 5.9 | 6.2 | 7.1 | 6.0 | 5.7 | 5.0 | 5.6 | 4.8 | 4.5 | 3.9 |
| Lexington, Ky. | 6.6 | 6.0 | 6.2 | 6.1 | 5.9 | 6.1 | 5.7 | 5.7 | 6.5 | 6.7 | 7.6 | 7.6 | 8.2 | 8.4 | 8.1 | 8.2 | 7.9 | 7.6 | 6.0 | 4.9 | 5.6 | 6.0 | 6.3 | 5.7 | 6.7 |
| Little Rock, Ark. | 2.5 | 2.3 | 2.5 | 3.0 | 3.0 | 3.0 | 2.9 | 3.5 | 4.0 | 4.4 | 5.3 | 5.7 | 6.6 | 7.5 | 7.0 | 7.1 | 7.1 | 6.8 | 6.3 | 5.2 | 3.7 | 2.7 | 2.5 | 2.5 | 4.5 |
| Los Angeles, Cal. | 2.6 | 2.2 | 1.8 | 1.5 | 1.3 | 1.5 | 1.4 | 1.5 | 1.6 | 1.9 | 2.5 | 2.7 | 3.6 | 4.6 | 6.0 | 7.7 | 8.9 | 9.5 | 9.0 | 8.0 | 6.9 | 5.5 | 4.4 | 3.1 | 4.2 |
| Louisville, Ky. | 3.3 | 3.6 | 3.3 | 3.3 | 3.3 | 3.4 | 3.4 | 4.0 | 5.0 | 5.6 | 6.5 | 7.4 | 7.9 | 8.2 | 8.5 | 8.3 | 7.4 | 6.5 | 5.8 | 4.9 | 4.1 | 3.9 | 3.6 | 3.5 | 5.2 |
| Lynchburg, Va. | 1.5 | 1.6 | 1.5 | 1.5 | 1.5 | 1.2 | 1.5 | 2.5 | 3.2 | 4.0 | 4.4 | 4.9 | 5.3 | 5.5 | 5.4 | 5.1 | 4.9 | 4.2 | 3.3 | 2.6 | 2.2 | 1.9 | 1.7 | 1.6 | 3.1 |
| Marquette, Mich. | 8.0 | 8.6 | 8.4 | 7.8 | 7.3 | 7.9 | 6.8 | 7.2 | 7.5 | 8.0 | 8.7 | 8.9 | 8.7 | 9.0 | 8.6 | 8.5 | 8.7 | 7.7 | 7.3 | 6.0 | 5.3 | 6.1 | 6.7 | 7.4 | 7.7 |
| Memphis, Tenn. | 5.1 | 5.0 | 5.4 | 5.7 | 5.5 | 5.6 | 5.5 | 5.1 | 5.1 | 5.8 | 5.7 | 6.6 | 6.9 | 7.5 | 7.5 | 7.4 | 7.6 | 7.4 | 6.2 | 5.2 | 5.1 | 5.1 | 5.3 | 5.3 | 5.9 |
| Milwaukee, Wis. | 7.1 | 7.6 | 7.6 | 7.1 | 7.4 | 7.5 | 7.5 | 7.1 | 8.5 | 9.0 | 10.0 | 9.9 | 10.9 | 11.7 | 12.0 | 12.1 | 12.2 | 11.2 | 9.2 | 7.6 | 6.5 | 6.7 | 7.0 | 7.1 | 8.8 |
| Minneapolis, Minn. | 8.5 | 7.8 | 8.2 | 7.5 | 7.2 | 7.5 | 8.1 | 7.9 | 7.6 | 8.1 | 8.4 | 9.0 | 9.8 | 9.4 | 9.5 | 9.2 | 9.6 | 9.5 | 9.4 | 8.9 | 9.0 | 8.9 | 8.6 | 8.9 | 8.6 |
| Mobile, Ala. | 3.6 | 3.9 | 3.4 | 3.0 | 3.6 | 3.3 | 3.0 | 3.5 | 4.2 | 4.7 | 6.0 | 6.2 | 6.7 | 7.4 | 7.8 | 7.4 | 7.1 | 7.1 | 5.7 | 5.1 | 4.4 | 4.1 | 4.2 | 3.8 | 5.0 |
| Montgomery, Ala. | 4.2 | 4.1 | 4.4 | 4.2 | 4.0 | 3.7 | 4.2 | 4.5 | 5.2 | 5.6 | 5.9 | 6.1 | 7.1 | 6.9 | 6.7 | 7.7 | 7.7 | 7.0 | 5.9 | 5.8 | 5.4 | 4.8 | 4.5 | 4.8 | 5.4 |
| Moorhead, Minn. | 7.8 | 7.6 | 6.9 | 7.2 | 7.6 | 7.5 | 6.6 | 6.3 | 6.6 | 7.2 | 7.5 | 8.4 | 9.4 | 10.2 | 10.1 | 10.1 | 9.7 | 9.4 | 9.5 | 8.5 | 7.9 | 7.5 | 7.5 | 7.5 | 8.1 |
| Nantucket, Mass. | 7.1 | 7.3 | 7.0 | 6.8 | 6.7 | 6.9 | 7.0 | 7.5 | 8.5 | 9.1 | 9.2 | 9.1 | 8.8 | 9.8 | 9.5 | 8.8 | 8.5 | 7.9 | 7.1 | 6.9 | 7.2 | 6.7 | 7.1 | 7.5 | 7.8 |
| Nashville, Tenn. | 2.4 | 2.4 | 2.2 | 2.2 | 2.4 | 2.2 | 2.6 | 2.8 | 3.9 | 4.2 | 5.3 | 6.3 | 6.4 | 6.5 | 7.2 | 7.2 | 7.0 | 6.0 | 5.6 | 4.0 | 3.1 | 2.3 | 2.1 | 2.3 | 4.1 |
| Neah, Wash. | 7.2 | 6.9 | 6.5 | 6.1 | 6.4 | 6.1 | 5.5 | 5.2 | 4.5 | 4.5 | 4.3 | 4.9 | 5.8 | 7.4 | 8.0 | 9.3 | 10.5 | 11.3 | 11.1 | 11.4 | 10.5 | 9.3 | 8.1 | 7.1 | 7.4 |
| New Haven, Conn. | 5.5 | 5.2 | 5.1 | 5.6 | 5.5 | 5.1 | 5.1 | 6.4 | 7.0 | 7.1 | 7.5 | 8.8 | 9.6 | 10.6 | 10.1 | 10.2 | 9.9 | 8.0 | 7.0 | 6.5 | 5.5 | 5.3 | 5.2 | 5.1 | 7.0 |
| New Orleans, La. | 4.5 | 4.2 | 4.3 | 4.0 | 4.7 | 4.5 | 4.5 | 4.7 | 6.2 | 7.1 | 8.0 | 8.0 | 8.8 | 8.9 | 8.7 | 8.5 | 9.0 | 8.2 | 7.6 | 5.9 | 5.2 | 5.0 | 5.0 | 5.1 | 6.3 |
| New York, N. Y. | 9.7 | 8.9 | 7.7 | 8.5 | 8.5 | 8.7 | 8.7 | 9.0 | 9.4 | 9.0 | 9.0 | 9.8 | 11.2 | 12.3 | 12.3 | 12.7 | 13.4 | 12.0 | 10.9 | 10.7 | 10.1 | 9.7 | 9.9 | 9.8 | 10.1 |
| Norfolk, Va. | 7.0 | 6.8 | 6.9 | 6.4 | 5.9 | 5.5 | 5.6 | 6.6 | 6.8 | 6.9 | 6.9 | 7.0 | 9.9 | 8.2 | 8.0 | 8.4 | 9.0 | 8.5 | 7.2 | 6.7 | 6.9 | 6.8 | 6.9 | 6.5 | 7.0 |
| Northfield, Vt. | 6.6 | 6.1 | 5.7 | 5.3 | 5.1 | 5.1 | 4.9 | 5.5 | 6.8 | 8.3 | 9.6 | 10.4 | 10.3 | 10.4 | 9.8 | 9.3 | 8.3 | 6.5 | 5.9 | 5.9 | 6.4 | 6.4 | 6.5 | 6.4 | 7.1 |
| North Platte, Nebr. | 7.7 | 7.1 | 6.7 | 5.8 | 4.9 | 4.6 | 4.8 | 4.6 | 4.2 | 6.5 | 7.5 | 7.8 | 9.5 | 10.6 | 11.2 | 11.5 | 11.7 | 11.3 | 11.7 | 11.1 | 8.8 | 8.2 | 8.3 | 8.2 | 8.1 |
| Oklahoma, Okla. | 6.6 | 6.3 | 6.1 | 6.3 | 6.2 | 6.2 | 5.9 | 6.1 | 6.9 | 8.5 | 9.5 | 9.7 | 9.3 | 10.2 | 10.1 | 10.5 | 10.9 | 10.4 | 9.3 | 7.5 | 5.9 | 5.4 | 6.0 | 6.4 | 7.8 |

TABLE VI.—*Average wind movement, etc.*—Continued.

| Stations. | 1 a. m. | 2 a. m. | 3 a. m. | 4 a. m. | 5 a. m. | 6 a. m. | 7 a. m. | 8 a. m. | 9 a. m. | 10 a. m. | 11 a. m. | Noon. | 1 p. m. | 2 p. m. | 3 p. m. | 4 p. m. | 5 p. m. | 6 p. m. | 7 p. m. | 8 p. m. | 9 p. m. | 10 p. m. | 11 p. m. | Midnight. | Mean. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Omaha, Nebr | 6.2 | 5.6 | 5.2 | 5.2 | 4.6 | 4.6 | 4.6 | 4.7 | 5.3 | 6.2 | 6.9 | 7.2 | 8.5 | 9.3 | 9.8 | 9.9 | 10.0 | 9.3 | 8.2 | 6.9 | 6.2 | 6.0 | 6.6 | 6.2 | 6.8 |
| Oswego, N. Y. | 8.2 | 8.4 | 8.5 | 8.2 | 8.1 | 7.9 | 8.1 | 8.3 | 9.0 | 9.0 | 10.1 | 10.3 | 10.0 | 9.7 | 8.5 | 8.9 | 8.6 | 7.7 | 6.4 | 6.7 | 7.3 | 7.7 | 7.4 | 7.8 | 8.4 |
| Palestine, Tex. | 3.9 | 3.2 | 3.1 | 2.9 | 2.5 | 2.5 | 2.5 | 2.5 | 4.1 | 5.4 | 5.5 | 5.9 | 6.1 | 6.6 | 6.6 | 6.9 | 6.8 | 4.3 | 3.7 | 4.7 | 3.9 | 3.8 | 3.8 | 3.9 | 4.6 |
| Parkersburg, W. Va. | 2.8 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 | 2.9 | 3.4 | 4.0 | 4.3 | 5.0 | 5.2 | 5.9 | 6.5 | 6.7 | 5.8 | 5.3 | 4.3 | 6.2 | 3.5 | 3.0 | 3.1 | 2.9 | 2.8 | 3.9 |
| Pensacola, Fla. | 7.1 | 7.1 | 6.9 | 6.8 | 6.6 | 6.9 | 7.3 | 6.8 | 7.7 | 8.0 | 8.3 | 8.6 | 8.9 | 9.2 | 10.0 | 9.9 | 9.6 | 9.9 | 8.3 | 7.3 | 5.8 | 5.8 | 6.5 | 6.5 | 7.7 |
| Philadelphia, Pa. | 7.1 | 7.0 | 6.9 | 7.0 | 6.4 | 6.2 | 6.8 | 7.4 | 8.2 | 8.7 | 9.4 | 9.9 | 10.8 | 10.6 | 11.3 | 11.1 | 10.6 | 9.7 | 7.9 | 7.7 | 7.4 | 7.2 | 6.5 | 6.5 | 8.3 |
| Phenix, Ariz. | 5.1 | 4.5 | 5.1 | 4.6 | 4.5 | 4.3 | 3.8 | 3.8 | 3.4 | 3.1 | 3.8 | 4.4 | 4.3 | 4.7 | 5.1 | 5.3 | 5.5 | 5.1 | 5.3 | 5.5 | 4.8 | 4.9 | 4.5 | 5.2 | 4.6 |
| Pierre, S. Dak. | 7.7 | 7.5 | 6.6 | 6.5 | 6.1 | 5.8 | 5.9 | 5.9 | 6.7 | 7.7 | 9.0 | 9.5 | 10.5 | 10.5 | 10.6 | 10.7 | 10.7 | 10.0 | 9.7 | 9.3 | 9.0 | 8.8 | 8.8 | 8.5 | 8.4 |
| Pittsburg, Pa. | 3.4 | 3.6 | 3.2 | 3.2 | 3.5 | 3.5 | 3.8 | 4.5 | 4.7 | 5.6 | 5.8 | 6.1 | 6.6 | 6.6 | 6.4 | 6.3 | 6.7 | 5.5 | 4.7 | 4.3 | 4.0 | 4.1 | 4.0 | 4.1 | 4.8 |
| Point Reyes Lt., Cal. | 22.8 | 22.4 | 22.0 | 22.0 | 21.6 | 20.9 | 21.3 | 21.1 | 19.9 | 19.2 | 17.6 | 16.7 | 16.5 | 16.9 | 16.9 | 17.1 | 17.4 | 18.6 | 20.0 | 21.4 | 22.7 | 25.1 | 25.3 | 24.2 | 20.4 |
| Port Angeles, Wash. | 4.8 | 4.6 | 4.9 | 4.7 | 4.0 | 4.1 | 3.9 | 4.2 | 3.6 | 3.4 | 3.7 | 4.8 | 6.5 | 7.1 | 7.9 | 8.4 | 8.6 | 9.5 | 10.6 | 10.1 | 9.1 | 7.6 | 6.0 | 5.5 | 6.2 |
| Port Huron, Mich. | 6.7 | 7.1 | 7.3 | 7.1 | 7.0 | 6.8 | 6.1 | 5.5 | 5.5 | 5.6 | 6.3 | 7.8 | 10.1 | 10.8 | 11.3 | 12.0 | 11.9 | 11.6 | 9.7 | 8.4 | 7.4 | 6.6 | 6.5 | 6.7 | 8.4 |
| Portland, Me. | 4.4 | 4.1 | 4.0 | 4.2 | 4.1 | 4.3 | 4.5 | 4.2 | 3.8 | 4.7 | 7.6 | 9.4 | 8.4 | 9.0 | 9.2 | 9.0 | 8.4 | 7.1 | 5.4 | 4.8 | 4.6 | 4.4 | 4.0 | 5.9 | 5.9 |
| Portland, Oreg. | 9.1 | 7.5 | 6.7 | 6.5 | 5.4 | 4.5 | 4.2 | 4.0 | 3.2 | 2.8 | 5.0 | 5.7 | 6.8 | 7.9 | 8.9 | 9.2 | 10.0 | 10.3 | 8.0 | 9.3 | 9.2 | 9.3 | 9.9 | 9.8 | 7.0 |
| Pueblo, Colo. | 5.8 | 4.7 | 4.6 | 4.7 | 4.8 | 4.2 | 4.0 | 3.8 | 5.4 | 5.8 | 6.1 | 5.9 | 6.2 | 6.6 | 7.1 | 7.4 | 7.3 | 6.5 | 5.0 | 4.4 | 4.5 | 4.2 | 4.1 | 3.9 | 5.1 |
| Raleigh, N. C. | 4.2 | 4.1 | 3.9 | 3.7 | 3.5 | 3.5 | 3.7 | 4.5 | 5.1 | 5.7 | 6.7 | 8.2 | 9.4 | 9.9 | 10.3 | 10.9 | 9.9 | 8.6 | 9.4 | 8.5 | 7.1 | 6.8 | 5.2 | 7.1 | 7.4 |
| Rapid City, S. Dak. | 6.9 | 7.0 | 6.0 | 5.7 | 5.4 | 5.1 | 5.6 | 5.6 | 3.3 | 7.3 | 3.6 | 4.0 | 3.9 | 3.9 | 4.4 | 5.1 | 6.0 | 6.1 | 6.2 | 6.3 | 6.1 | 5.2 | 4.8 | 7.6 | 5.0 |
| Red Bluff, Cal. | 5.0 | 5.0 | 4.1 | 4.3 | 4.0 | 3.9 | 3.7 | 3.2 | 6.3 | 7.3 | 7.5 | 7.9 | 8.3 | 8.5 | 8.7 | 8.8 | 8.3 | 7.4 | 6.5 | 5.3 | 4.9 | 4.8 | 4.8 | 5.0 | 4.6 |
| Richmond, Va. | 4.4 | 4.2 | 4.1 | 3.5 | 3.5 | 3.6 | 4.1 | 5.1 | 7.1 | 7.6 | 8.2 | 8.7 | 8.6 | 9.3 | 9.4 | 9.3 | 8.8 | 7.5 | 5.9 | 5.3 | 5.7 | 5.7 | 5.6 | 5.6 | 5.9 |
| Rochester, N. Y. | 5.1 | 5.6 | 5.6 | 5.6 | 5.2 | 5.0 | 5.0 | 6.0 | | | | | | | | | | | | | | | | | 6.7 |
| Roseburg, Oreg. | 2.0 | 1.6 | 1.6 | 1.3 | 1.3 | 1.2 | 1.2 | 1.6 | 1.4 | 1.5 | 1.7 | 2.3 | 2.5 | 3.2 | 3.5 | 4.6 | 5.5 | 6.5 | 7.2 | 7.7 | 7.6 | 6.5 | 4.8 | 3.0 | 3.4 |
| Sacramento, Cal. | 9.9 | 10.2 | 10.3 | 11.0 | 11.3 | 10.4 | 9.9 | 9.2 | 8.6 | 7.5 | 7.4 | 7.4 | 6.9 | 7.1 | 7.7 | 8.6 | 8.7 | 9.3 | 10.7 | 11.1 | 11.5 | 11.5 | 11.2 | 10.9 | 9.5 |
| St. Louis, Mo. | 5.4 | 6.0 | 6.3 | 6.1 | 5.9 | 6.4 | 6.1 | 6.3 | 6.9 | 7.6 | 7.6 | 7.6 | 8.4 | 8.5 | 8.6 | 8.8 | 8.8 | 8.5 | 8.3 | 8.6 | 7.7 | 5.9 | 6.1 | 5.7 | 7.0 |
| St. Paul, Minn. | 4.2 | 4.2 | 4.1 | 3.9 | 4.2 | 4.0 | 4.3 | 4.6 | 5.5 | 6.0 | 7.2 | 8.0 | 8.2 | 8.2 | 8.5 | 8.6 | 8.6 | 7.9 | 7.0 | 6.9 | 5.7 | 5.0 | 4.4 | 4.3 | 5.9 |
| Salt Lake City, Utah. | 5.2 | 5.3 | 5.3 | 5.0 | 4.4 | 4.5 | 4.6 | 4.6 | 4.4 | 4.0 | 4.4 | 4.9 | 6.7 | 8.3 | 8.3 | 8.6 | 9.2 | 8.6 | 7.1 | 6.0 | 5.4 | 6.1 | 5.9 | 5.7 | 6.0 |
| San Antonio, Tex. | 7.8 | 5.7 | 5.0 | 4.2 | 4.2 | 3.9 | 4.1 | 4.0 | 5.8 | 6.7 | 6.9 | 6.5 | 6.7 | 6.8 | 7.5 | 7.5 | 9.6 | 10.6 | 9.8 | 9.8 | 10.4 | 10.6 | 10.3 | 10.4 | 9.0 | 7.3 |
| San Diego, Cal. | 2.6 | 2.5 | 1.9 | 2.0 | 1.9 | 1.9 | 2.4 | 2.1 | 2.0 | 2.1 | 3.1 | 4.4 | 7.0 | 7.2 | 8.8 | 7.5 | 10.1 | 9.9 | 9.7 | 10.7 | 8.6 | 7.5 | 6.0 | 4.4 | 3.6 | 5.2 |
| Sandusky, Ohio | 5.7 | 5.7 | 5.8 | 6.0 | 6.4 | 6.3 | 6.2 | 6.8 | 6.8 | 6.9 | 7.5 | 9.2 | 10.0 | 11.5 | 13.6 | 16.5 | 19.4 | 23.1 | 24.2 | 22.6 | 21.8 | 19.5 | 17.4 | 15.7 | 14.6 |
| San Francisco, Cal. | 13.6 | 12.8 | 11.4 | 10.6 | 10.8 | 9.6 | 9.7 | 9.7 | 8.8 | 8.5 | 8.5 | 9.2 | 11.1 | 11.5 | 13.6 | 15.9 | 19.4 | 21.2 | 23.1 | 24.2 | 22.6 | 21.8 | 19.5 | 17.4 | 15.7 | 14.6 |
| San Luis Obispo, Cal. | 2.6 | 2.5 | 2.2 | 2.0 | 1.9 | 2.2 | 2.2 | 2.1 | 2.5 | 2.5 | 2.6 | 3.1 | 4.2 | 5.2 | 5.9 | 6.5 | 6.5 | 6.9 | 6.9 | 7.0 | 6.6 | 5.8 | 4.6 | 3.6 | 3.3 | 4.0 |
| Santa Fe, N. Mex. | 6.0 | 5.2 | 4.5 | 3.9 | 3.5 | 3.2 | 3.0 | 2.8 | 2.6 | 4.1 | 5.6 | 8.3 | 8.5 | 9.3 | 10.3 | 10.7 | 10.9 | 9.5 | 9.1 | 8.2 | 7.6 | 8.3 | 7.5 | 8.1 | 7.2 | 7.1 | 5.8 |
| Sault Ste. Marie, Mich. | 5.3 | 5.1 | 4.9 | 4.7 | 4.2 | 5.0 | 4.5 | 5.0 | 5.2 | 7.4 | 8.3 | 8.7 | 8.5 | 9.4 | 11.1 | 5.2 | 10.9 | 5.1 | 5.0 | 5.7 | 6.8 | 5.7 | 6.6 | 6.5 | 4.9 | 4.9 | 6.8 |
| Savannah, Ga. | 6.1 | 6.4 | 6.4 | 6.1 | 6.1 | 5.9 | 5.5 | 5.9 | 2.7 | 2.8 | 3.2 | 4.8 | 3.5 | 4.5 | 5.1 | 7.0 | 5.3 | 6.7 | 6.3 | 5.8 | 5.7 | 4.4 | 3.9 | 3.8 | 3.9 | 3.8 | 4.6 |
| Seattle, Wash. | 3.0 | 2.9 | 2.7 | 2.5 | 2.8 | 2.9 | 2.7 | 3.1 | 3.9 | 4.6 | 4.8 | 5.5 | 6.2 | 6.0 | 7.0 | 6.5 | 6.5 | 6.7 | 6.3 | 5.8 | 4.4 | 3.9 | 3.8 | 3.9 | 3.8 | 4.6 | 4.6 |
| Shreveport, La. | 4.0 | 3.3 | 3.7 | 3.3 | 3.2 | 3.2 | 3.1 | 3.1 | 3.9 | 4.6 | 4.8 | 5.5 | 6.2 | 6.0 | 7.0 | 6.5 | 6.5 | 6.7 | 6.3 | 5.8 | 4.4 | 3.9 | 3.8 | 3.9 | 3.8 | 4.6 | 4.6 |
| Sioux City, Iowa | 9.8 | 9.1 | 8.6 | 9.1 | 8.7 | 8.8 | 8.8 | 8.8 | 9.1 | 9.2 | 9.9 | 10.6 | 11.6 | 12.7 | 13.0 | 13.3 | 13.0 | 12.8 | 12.2 | 11.1 | 9.4 | 9.2 | 9.5 | 9.1 | 10.0 | 10.4 |
| Spokane, Wash. | 3.4 | 3.0 | 2.8 | 2.4 | 2.9 | 2.9 | 2.8 | 3.5 | 3.4 | 3.8 | 4.7 | 5.2 | 7.3 | 7.5 | 6.3 | 6.0 | 6.0 | 6.5 | 7.2 | 6.4 | 6.6 | 6.6 | 5.0 | 4.2 | 3.9 | 4 6 |
| Springfield, Ill. | 5.3 | 5.0 | 5.2 | 5.0 | 4.8 | 5.0 | 4.8 | 4.9 | 5.3 | 7.0 | 6.1 | 7.6 | 7.5 | 7.5 | 7.6 | 8.0 | 7.9 | 7.5 | 6.8 | 5.8 | 5.4 | 4.5 | 4.9 | 4.9 | 5.3 | 5.8 |
| Springfield, Mo. | 6.8 | 6.4 | 6.4 | 6.8 | 6.4 | 5.0 | 6.1 | 4.8 | 5.9 | 3.0 | 7.0 | 3.6 | 3.6 | 4.4 | 4.9 | 7.3 | 7.2 | 6.2 | 5.8 | 5.6 | 5.4 | 4.8 | 5.8 | 6.9 | 5.3 | 5.3 | 6.7 |
| Tacoma, Wash. | 4.2 | 3.8 | 3.0 | 3.0 | 3.0 | 2.9 | 2.5 | 2.5 | 2.7 | 5.9 | 3.0 | 7.5 | 7.6 | 7.2 | 7.3 | 8.1 | 7.8 | 6.9 | 6.4 | 4.5 | 3.7 | 3.3 | 3.3 | 3.4 | 3.1 | 4.8 |
| Tampa, Fla. | 4.9 | 4.8 | 4.7 | 4.5 | 4.6 | 4.3 | 5.0 | 6.0 | 7.4 | 7.4 | 8.3 | 8.8 | 9.6 | 10.3 | 10.0 | 9.8 | 10.0 | 8.2 | 8.2 | 5.6 | 4.5 | 5.3 | 5.3 | 6.4 | 6.1 | 6.7 |
| Toledo, Ohio | 6.5 | 6.7 | 6.6 | 6.3 | 6.7 | 6.4 | 3.8 | 6.7 | 7.6 | 7.4 | 4.5 | 4.8 | 4.9 | 5.5 | 5.7 | 5.8 | 10.0 | 5.8 | 5.8 | 5.6 | 5.1 | 5.8 | 5.3 | 6.4 | 6.5 | 7.8 |
| Vicksburg, Miss. | 4.8 | 4.9 | 4.3 | 4.1 | 3.8 | 3.8 | 3.7 | 3.8 | 3.9 | 7.6 | 7.6 | 8.2 | 8.8 | 9.2 | 9.7 | 9.6 | 9.3 | 8.6 | 8.2 | 7.3 | 7.0 | 6.6 | 6.1 | 6.6 | 6.5 | 7.0 |
| Vineyard Haven, Mass. | 7.0 | 6.3 | 5.8 | 6.1 | 5.8 | 5.4 | 5.5 | 5.3 | 5.5 | 6.9 | 7.5 | 6.4 | 7.0 | 7.8 | 7.9 | 8.3 | 7.7 | 6.9 | 6.4 | 4.5 | 3.7 | 3.3 | 3.3 | 3.4 | 3.1 | 4.8 |
| Walla Walla, Wash. | 6.1 | 5.2 | 4.9 | 5.1 | 5.0 | 5.0 | 5.3 | 5.5 | 7.6 | 7.4 | 8.3 | 8.8 | 9.6 | 10.3 | 10.0 | 9.8 | 10.0 | 9.0 | 8.7 | 7.9 | 7.0 | 5.7 | 5.3 | 6.4 | 6.1 | 6.7 |
| Washington, D. C. | 3.0 | 3.1 | 2.8 | 2.9 | 2.7 | 2.9 | 3.2 | 4.5 | 5.3 | 5.7 | 6.2 | 7.0 | 7.8 | 7.9 | 8.3 | 7.7 | 6.9 | 6.4 | 4.5 | 3.7 | 3.3 | 3.3 | 3.4 | 3.1 | 4.8 |
| Wichita, Kans. | 5.8 | 5.5 | 5.5 | 5.0 | 5.3 | 5.5 | 5.1 | 5.6 | 6.2 | 6.9 | 7.4 | 8.0 | 8.7 | 8.8 | 9.0 | 9.0 | 8.7 | 7.9 | 7.0 | 5.7 | 5.3 | 5.3 | 6.4 | 6.1 | 6.7 |
| Williston, N. Dak. | 5.8 | 5.9 | 5.7 | 5.6 | 4.9 | 4.3 | 5.1 | 5.1 | 6.3 | 6.7 | 7.5 | 8.5 | 9.9 | 10.5 | 10.4 | 10.7 | 10.7 | 11.3 | 10.7 | 11.3 | 10.4 | 8.6 | 8.4 | 7.5 | 6.1 | 7.8 |
| Wilmington, N. C. | 5.5 | 4.8 | 4.6 | 4.4 | 4.5 | 4.5 | 4.8 | 6.0 | 7.0 | 7.6 | 8.3 | 9.1 | 9.3 | 10.0 | 10.4 | 10.4 | 9.0 | 8.7 | 7.9 | 7.3 | 6.3 | 5.8 | 6.1 | 6.6 | 5.6 | 7.0 |
| Winnemucca, Nev. | 7.7 | 8.8 | 8.5 | 8.5 | 8.0 | 8.3 | 8.6 | 8.4 | 7.5 | 7.0 | 7.2 | 7.8 | 8.6 | 9.3 | 10.0 | 10.4 | 9.1 | 9.1 | 10.1 | 10.9 | 9.7 | 9.6 | 7.6 | 6.4 | 7.7 | 8.4 |
| Woods Hole, Mass. | 11.5 | 11.5 | 11.1 | 11.1 | 10.9 | 10.1 | 10.6 | 11.3 | 11.4 | 11.1 | 11.6 | 13.0 | 14.5 | 14.9 | 15.0 | 14.5 | 14.5 | 13.5 | 12.8 | 13.3 | 13.6 | 11.9 | 12.3 | 12.9 | 12.5 |
| Yankton, S. Dak. | 6.5 | 6.1 | 5.9 | 5.4 | 5.5 | 5.2 | 5.1 | 5.4 | 5.6 | 7.4 | 8.5 | 9.3 | 10.1 | 10.0 | 10.0 | 9.6 | 9.6 | 9.4 | 7.0 | 5.4 | 5.8 | 5.3 | 5.8 | 6.0 | 6.6 | 7.1 |

TABLE VII.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of August, 1898.*

| Stations. | Component direction from— | | | | Resultant. | |
|---|---|---|---|---|---|---|
| | N. | S. | E. | W. | Direction from— | Duration. |
| *New England.* | *Hours.* | *Hours.* | *Hours.* | *Hours.* | ° | *Hours.* |
| Eastport, Me | 15 | 23 | 13 | 20 | s. 41 w. | 11 |
| Portland, Me | 12 | 25 | 5 | 31 | s. 63 w. | 29 |
| Northfield, Vt | 8 | 44 | 4 | 13 | s 14 w. | 37 |
| Boston, Mass | 12 | 20 | 6 | 36 | s. 75 w. | 31 |
| Nantucket, Mass | 7 | 30 | 5 | 36 | s. 34 w. | 39 |
| Woods Hole, Mass.* | 3 | 18 | 3 | 14 | s. 36 w. | 19 |
| Block Island, R. I | 9 | 28 | 12 | 34 | s. 49 w. | 29 |
| New Haven Conn | 17 | 23 | 7 | 27 | s. 73 w. | 21 |
| *Middle Atlantic States.* | | | | | | |
| Albany, N. Y | 13 | 35 | 8 | 14 | s. 15 w. | 23 |
| Binghamton, N. Y.† | 12 | 8 | 10 | 13 | n. 37 w. | 50 |
| New York, N. Y | 12 | 25 | 13 | 25 | s. 43 w. | 18 |
| Harrisburg, Pa.† | 7 | 7 | 5 | 18 | w. | 13 |
| Philadelphia, Pa | 11 | 26 | 11 | 25 | s. 47 w. | 20 |
| Atlantic City, N. J | 9 | 27 | 9 | 34 | s. 54 w. | 31 |
| Cape May, N. J | 10 | 38 | 9 | 14 | s. 10 w. | 28 |
| Baltimore, Md | 13 | 30 | 16 | 23 | s. 22 w. | 18 |
| Washington, D. C | 15 | 32 | 7 | 19 | s. 35 w. | 21 |
| Lynchburg, Va | 12 | 28 | 16 | 23 | s. 24 w. | 18 |
| Norfolk, Va | 5 | 38 | 12 | 22 | s. 17 w. | 34 |
| Richmond, Va | 14 | 34 | 15 | 9 | s. 17 e. | 21 |
| *South Atlantic States.* | | | | | | |
| Charlotte, N. C | 7 | 37 | 19 | 13 | s. 11 e. | 31 |
| Hatteras, N. C | 4 | 40 | 13 | 16 | s. 5 w. | 36 |
| Raleigh, N. C | 7 | 34 | 11 | 24 | s. 26 w. | 30 |
| Wilmington, N. C | 9 | 31 | 16 | 25 | s. 22 w. | 24 |
| Charleston, S. C | 12 | 27 | 18 | 12 | s. 22 e. | 16 |
| Augusta, Ga | 9 | 38 | 17 | 11 | s. 12 e. | 30 |
| Savannah, Ga | 14 | 30 | 20 | 12 | s. 27 e. | 18 |
| Jacksonville, Fla | 9 | 36 | 25 | 6 | s. 35 e. | 33 |
| *Florida Peninsula.* | | | | | | |
| Jupiter, Fla | 4 | 32 | 32 | 7 | s. 41 e. | 38 |
| Key West, Fla | 4 | 22 | 41 | 2 | s. 65 e. | 43 |
| Tampa, Fla | 14 | 17 | 24 | 11 | s. 77 e. | 13 |
| *Eastern Gulf States.* | | | | | | |
| Atlanta, Ga | 14 | 27 | 27 | 10 | s. 52 e. | 22 |
| Pensacola, Fla | 17 | 22 | 19 | 23 | s. 39 w. | 6 |
| Mobile, Ala | 22 | 21 | 17 | 12 | n. 79 e. | 5 |
| Montgomery, Ala | 9 | 31 | 28 | 10 | s. 39 e. | 28 |
| Vicksburg, Miss | 28 | 15 | 28 | 7 | n. 59 e. | 25 |
| New Orleans, La | 14 | 29 | 20 | 16 | s. 15 e. | 16 |
| *Western Gulf States.* | | | | | | |
| Shreveport, La | 18 | 23 | 32 | 7 | s. 79 e. | 26 |
| Fort Smith, Ark | 11 | 8 | 44 | 7 | n. 85 e. | 37 |
| Little Rock, Ark | 16 | 15 | 31 | 11 | n. 87 e. | 20 |
| Corpus Christi, Tex | 11 | 33 | 29 | 11 | s. 39 e. | 28 |
| Galveston, Tex | 9 | 35 | 21 | 12 | s. 19 e. | 28 |
| Palestine, Tex | 21 | 23 | 26 | 5 | s. 85 e. | 21 |
| San Antonio, Tex | 17 | 28 | 37 | 1 | s. 73 e. | 38 |
| *Ohio Valley and Tennessee.* | | | | | | |
| Chattanooga, Tenn | 17 | 26 | 19 | 17 | s. 13 e. | 9 |
| Knoxville, Tenn | 27 | 17 | 17 | 17 | n. | 10 |
| Memphis, Tenn | 23 | 13 | 20 | 17 | n. 17 e. | 10 |
| Nashville, Tenn | 20 | 17 | 15 | 27 | n. 76 w. | 12 |
| Lexington, Ky | 10 | 29 | 9 | 25 | s. 40 w. | 25 |
| Louisville, Ky | 13 | 30 | 13 | 13 | s. | 16 |
| Evansville, Ind.† | 8 | 16 | 8 | 10 | s. 14 w. | 8 |
| Indianapolis, Ind | 22 | 23 | 6 | 25 | s. 87 w. | 19 |
| Cincinnati, Ohio | 14 | 26 | 22 | 18 | s. 18 e. | 13 |
| Columbus, Ohio | 17 | 30 | 10 | 20 | s. 38 w. | 16 |
| Pittsburg, Pa | 12 | 23 | 11 | 30 | s. 60 w. | 22 |
| Parkersburg, W. Va | 9 | 32 | 20 | 14 | s. 15 e. | 24 |
| *Lower Lake Region.* | | | | | | |
| Buffalo, N. Y | 11 | 24 | 10 | 31 | s. 59 w. | 25 |
| Oswego, N. Y | 8 | 34 | 9 | 23 | s. 28 w. | 30 |
| Rochester, N. Y | 9 | 33 | 6 | 35 | s. 50 w. | 38 |
| Erie, Pa | 8 | 28 | 10 | 27 | s. 40 w. | 26 |
| Cleveland, Ohio | 16 | 32 | 17 | 11 | s. 21 e. | 17 |
| Sandusky, Ohio | 10 | 30 | 12 | 26 | s. 39 w. | 22 |
| Toledo, Ohio | 11 | 21 | 12 | 33 | s. 65 w. | 23 |
| Detroit, Mich | 19 | 22 | 14 | 23 | s. 72 w. | 10 |
| *Upper Lake Region.* | | | | | | |
| Alpena, Mich | 24 | 16 | 18 | 22 | n. 27 w. | 9 |
| Grand Haven, Mich | 26 | 17 | 13 | 23 | n. 48 w. | 14 |
| Marquette, Mich | 26 | 16 | 11 | 24 | n. 52 w. | 16 |
| Port Huron, Mich | 22 | 24 | 12 | 18 | s. 72 w. | 6 |
| Sault Ste. Marie, Mich | 26 | 9 | 19 | 22 | n. 10 w. | 17 |
| Chicago, Ill | 17 | 26 | 21 | 15 | s. 34 e. | 11 |
| Milwaukee, Wis | 19 | 23 | 17 | 19 | s. 27 w. | 4 |

| Stations. | Component direction from— | | | | Resultant. | |
|---|---|---|---|---|---|---|
| | N. | S. | E. | W. | Direction from— | Duration. |
| *Upper Lake Region*—Cont'd. | *Hours.* | *Hours.* | *Hours.* | *Hours.* | ° | *Hours.* |
| Green Bay, Wis | 20 | 24 | 19 | 15 | s. 45 e. | 6 |
| Duluth, Minn | 31 | 7 | 22 | 19 | n. 7 e. | 24 |
| *North Dakota.* | | | | | | |
| Moorhead, Minn | 25 | 17 | 23 | 18 | n. 32 e. | 9 |
| Bismarck, N. Dak | 23 | 13 | 25 | 13 | n. 50 e. | 16 |
| Williston, N. Dak | 28 | 20 | 18 | 9 | n. 48 e. | 12 |
| *Upper Mississippi Valley.* | | | | | | |
| St. Paul, Minn | 26 | 21 | 13 | 19 | n. 50 w. | 8 |
| La Crosse, Wis.† | 6 | 18 | 4 | 5 | s. 5 w. | 12 |
| Davenport, Iowa | 16 | 19 | 22 | 19 | s. 45 e. | 4 |
| Des Moines, Iowa | 19 | 24 | 18 | 16 | s. 22 e. | 5 |
| Dubuque, Iowa | 19 | 24 | 16 | 19 | s. 31 w. | 6 |
| Keokuk, Iowa | 14 | 25 | 12 | 26 | s. 52 w. | 18 |
| Cairo, Ill | 19 | 28 | 10 | 18 | s. 42 w. | 12 |
| Springfield, Ill | 12 | 22 | 15 | 24 | s. 42 w. | 14 |
| Hannibal, Mo.† | 4 | 15 | 8 | 12 | s. 20 w. | 12 |
| St. Louis, Mo | 13 | 32 | 13 | 16 | s. 9 w. | 19 |
| *Missouri Valley.* | | | | | | |
| Columbia, Mo.* | 5 | 15 | 7 | 12 | s. 27 w. | 11 |
| Kansas City, Mo | 13 | 34 | 20 | 12 | s. 21 e | 22 |
| Springfield, Mo | 15 | 33 | 22 | 10 | s. 34 e | 22 |
| Lincoln, Nebr | 13 | 26 | 23 | 11 | s. 43 e. | 18 |
| Omaha, Nebr | 23 | 25 | 19 | 9 | n. 79 e. | 10 |
| Sioux City, Iowa† | 12 | 11 | 10 | 5 | s. 79 e. | 5 |
| Pierre, S. Dak | 19 | 23 | 26 | 10 | s. 76 e. | 16 |
| Huron, S. Dak | 18 | 24 | 19 | 13 | s. 45 e. | 8 |
| Yankton, S. Dak† | 12 | 6 | 12 | 8 | n. 34 e. | 7 |
| *Northern Slope.* | | | | | | |
| Havre, Mont | 22 | 7 | 20 | 27 | n. 25 w. | 17 |
| Miles City, Mont | 28 | 13 | 14 | 16 | n. 8 w. | 15 |
| Helena, Mont | 11 | 25 | 11 | 34 | s. 59 w. | 27 |
| Rapid City, S. Dak | 18 | 12 | 16 | 31 | n. 68 w. | 16 |
| Cheyenne, Wyo | 29 | 15 | 8 | 23 | n. 47 w. | 20 |
| Lander, Wyo | 12 | 25 | 15 | 27 | s. 43 w. | 18 |
| North Platte, Nebr | 18 | 29 | 20 | 10 | s. 42 e. | 15 |
| *Middle Slope.* | | | | | | |
| Denver, Colo | 18 | 35 | 10 | 13 | s. 10 w. | 17 |
| Pueblo, Colo | 22 | 11 | 14 | 29 | n. 54 w. | 19 |
| Concordia, Kans | 9 | 39 | 16 | 5 | s. 20 e. | 32 |
| Dodge, Kans | 10 | 40 | 19 | 7 | s. 22 e. | 32 |
| Wichita, Kans | 16 | 37 | 21 | 2 | s. 42 e. | 28 |
| Oklahoma, Okla | 9 | 40 | 13 | 7 | s. 11 e. | 32 |
| *Southern Slope.* | | | | | | |
| Abilene, Tex | 11 | 37 | 23 | 6 | s. 33 e. | 31 |
| Amarillo, Tex | 5 | 43 | 10 | 13 | s. 4 w. | 38 |
| *Southern Plateau.* | | | | | | |
| El Paso, Tex | 14 | 10 | 43 | 9 | n. 83 e. | 34 |
| Santa Fe, N. Mex | 9 | 27 | 30 | 7 | s. 52 e. | 29 |
| Phenix, Ariz | 20 | 9 | 22 | 26 | n. 20 w. | 12 |
| Yuma, Ariz | 7 | 28 | 20 | 22 | s. 5 w. | 21 |
| Independence, Cal | 15 | 26 | 8 | 25 | s. 57 w. | 20 |
| *Middle Plateau.* | | | | | | |
| Carson City, Nev | 12 | 17 | 7 | 38 | s. 81 w. | 31 |
| Winnemucca, Nev | 15 | 13 | 15 | 27 | n. 81 w. | 12 |
| Salt Lake City, Utah | 13 | 27 | 24 | 14 | s. 36 e. | 17 |
| *Northern Plateau.* | | | | | | |
| Baker City, Oreg | 19 | 32 | 8 | 16 | s. 34 w. | 14 |
| Idaho Falls, Idaho | 31 | 18 | 9 | 10 | n. 4 w. | 13 |
| Spokane, Wash | 17 | 21 | 23 | 12 | s. 70 e. | 12 |
| Walla Walla, Wash | 10 | 37 | 3 | 20 | s. 33 w. | 32 |
| *North Pacific Coast Region.* | | | | | | |
| Fort Canby, Wash | 30 | 18 | 5 | 18 | n. 47 w. | 18 |
| Neah, Wash | 2 | 3 | 11 | 47 | s. 88 w. | 36 |
| Port Angeles, Wash.* | 19 | 0 | 3 | 20 | n. 42 w. | 26 |
| Seattle, Wash | 23 | 22 | 6 | 19 | n. 86 w. | 13 |
| Tacoma, Wash | 30 | 11 | 3 | 29 | n. 54 w. | 32 |
| Portland, Oreg | 25 | 16 | 10 | 31 | n. 67 w. | 23 |
| Roseburg, Oreg | 40 | 4 | 12 | 15 | n. 5 w. | 36 |
| *Middle Pacific Coast Region.* | | | | | | |
| Eureka, Cal | 25 | 15 | 6 | 36 | n. 72 w. | 32 |
| Red Bluff, Cal | 14 | 34 | 24 | 4 | s. 45 e. | 28 |
| Sacramento, Cal | 4 | 47 | 6 | 21 | s. 19 w. | 46 |
| San Francisco, Cal | 1 | 25 | 0 | 52 | s. 65 w. | 57 |
| *South Pacific Coast Region.* | | | | | | |
| Fresno, Cal | 36 | 4 | 1 | 42 | n. 52 w. | 52 |
| Los Angeles, Cal | 2 | 23 | 2 | 50 | s. 66 w. | 52 |
| San Diego, Cal | 24 | 16 | 4 | 37 | n. 76 w. | 34 |
| San Luis Obispo, Cal | 24 | 15 | 3 | 28 | n. 70 w. | 27 |

*From observations at 8 p. m. only. †From observations at 8 a. m. only.

TABLE VIII.—*Thunderstorms and auroras, August, 1898.*

| States. | No. of stations. | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | Total. No. | Total. Days. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alabama | 55 | T. | 4 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 1 | .... | ... | 3 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | .... | 2 | ... | 1 | 2 | 4 | 2 | .... | .... | .... | .... | .... | 47 | 22 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Arizona | 56 | T. | 1 | 4 | 8 | 7 | 4 | 5 | 4 | 4 | 6 | 7 | 2 | 4 | 4 | 7 | 8 | 6 | 5 | 6 | 5 | 9 | 8 | 5 | 4 | 5 | 6 | 7 | 7 | 7 | 6 | 6 | 5 | 172 | 31 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Arkansas | 59 | T. | 6 | 13 | 2 | .... | .... | 2 | 11 | 9 | 3 | 1 | 4 | 1 | .... | .... | .... | .... | 3 | 9 | 1 | .... | .... | .... | 9 | 12 | 2 | 1 | 1 | .... | .... | .... | 1 | 90 | 19 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| California | 180 | T. | 1 | .... | .... | .... | .... | 4 | 2 | .... | 4 | 2 | 1 | 3 | 5 | 3 | 1 | .... | .... | .... | .... | 3 | 2 | 1 | .... | 1 | .... | .... | .... | 5 | 2 | .... | 2 | 42 | 16 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Colorado | 72 | T. | 15 | 2 | 3 | 2 | 13 | 20 | 6 | 11 | 7 | 1 | 5 | 7 | 10 | 9 | 5 | 17 | 15 | 7 | 6 | 11 | 9 | 14 | 6 | 1 | ... | .... | .... | 1 | .... | 1 | 17 | 221 | 27 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Connecticut | 21 | T. | .... | .... | 1 | 16 | 9 | .... | .... | 11 | 2 | 3 | .... | .... | .... | .... | .... | 12 | 15 | 6 | 8 | ... | .... | .... | 14 | 14 | 5 | .... | .... | .... | .... | .... | .... | 116 | 13 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | 1 | A. |
| Delaware | 5 | T. | .... | .... | .... | .... | .... | .... | .... | 2 | 2 | 2 | .... | .... | .... | .... | .... | .... | 1 | 1 | 1 | .... | .... | .... | .... | 1 | 1 | .... | .... | .... | 1 | .... | .... | 12 | 9 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Dist. of Columbia | 4 | T. | ... | .... | .... | 1 | .... | .... | .... | 1 | 1 | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | .... | .... | .... | 5 | 5 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Florida | 45 | T. | 5 | 5 | 4 | 5 | 5 | 7 | 6 | 8 | 7 | 8 | 7 | 9 | 7 | 4 | 5 | 8 | 1 | 6 | 4 | 8 | 9 | 5 | 9 | 4 | 6 | 4 | 6 | 7 | 4 | 4 | 3 | 178 | 31 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Georgia | 55 | T. | ... | 5 | 3 | 2 | 4 | 4 | 3 | 1 | 3 | 1 | 1 | 3 | 4 | .... | 1 | 1 | 2 | 2 | 2 | 1 | .... | 1 | 1 | 1 | 6 | 3 | 1 | 1 | 1 | 1 | 2 | 63 | 28 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Idaho | 38 | T. | .... | .... | 3 | 3 | 3 | .... | .... | .... | 3 | 1 | .... | 2 | 5 | 3 | 6 | 3 | .... | .... | 1 | 3 | 2 | .... | .... | 1 | 1 | 1 | 3 | 1 | 3 | 7 | 2 | 57 | 21 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | 1 | .... | 4 | 4 | A. |
| Illinois | 86 | T. | 4 | 15 | 11 | ... | .... | 1 | 13 | 8 | .... | .... | 1 | .... | 4 | 17 | 16 | 17 | 11 | 11 | 3 | 5 | 7 | .... | 16 | 20 | 3 | 23 | 7 | .... | 1 | ... | 1 | 215 | 24 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | 1 | .... | .... | .... | 1 | .... | .... | .... | .... | .... | .... | 1 | .... | .... | 4 | 4 | A. |
| Indiana | 57 | T. | 2 | 10 | 8 | .... | .... | .... | 4 | 3 | .... | .... | 3 | .... | .... | .... | 1 | 2 | 13 | 10 | .... | .... | 7 | 1 | 2 | 12 | .... | 8 | 6 | .... | 4 | 1 | .... | 95 | 26 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Indian Territory | 7 | T. | 1 | 1 | 1 | .... | .... | .... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | 2 | 2 | 1 | 1 | .... | .... | .... | .... | 1 | 12 | 10 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Iowa | 120 | T. | .... | 4 | .... | .... | 6 | 9 | 5 | ... | 3 | .... | .... | 2 | 8 | 10 | 10 | 8 | 2 | 1 | 13 | 13 | 4 | .... | 13 | 2 | .... | 7 | .... | 3 | .... | .. | .... | 121 | 19 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | 1 | A. |
| Kansas | 85 | T. | .... | 2 | 5 | .... | .... | 1 | 16 | 6 | .... | .... | .. | 7 | 8 | 4 | 2 | 9 | 14 | 9 | ... | .... | .... | . | 9 | 11 | .... | .... | .... | .... | .... | .... | .... | 108 | 14 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Kentucky | 48 | T. | 3 | 4 | 9 | .... | .... | 1 | 2 | 6 | 2 | .... | 2 | 2 | .... | .... | .... | .... | 2 | 9 | 1 | .... | .. | .... | 2 | 6 | 4 | .... | 2 | 1 | .... | .... | .... | 58 | 17 | A. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Louisiana | 46 | T. | 6 | 4 | 5 | 5 | 5 | 6 | 5 | 7 | 5 | 3 | 4 | 3 | 5 | 2 | 4 | 4 | 4 | 4 | 5 | 4 | 5 | 3 | 4 | 5 | 5 | 4 | 6 | 5 | 6 | 6 | 2 | 141 | 31 | T. |
| | | A. | .. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Maine | 18 | T. | .... | .... | .. | 3 | .. | .... | .... | .... | .... | .... | .... | .... | 2 | .... | .... | 2 | 6 | .... | .... | ... | 2 | .... | 1 | 6 | 2 | .... | .... | .... | 1 | 1 | .... | 26 | 10 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Maryland | 40 | T. | 11 | 3 | 5 | 11 | 2 | .... | 1 | 11 | 9 | 7 | .... | 4 | 1 | 2 | .... | .... | 8 | 14 | 8 | .... | .... | .... | .... | 8 | 5 | .... | .... | .... | .... | 1 | .... | 111 | 18 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Massachusetts | 59 | T. | 1 | .... | 1 | 25 | 1 | .... | 1 | 18 | 3 | 6 | ... | 1 | 2 | .... | .... | 6 | 23 | 15 | 5 | .... | .... | .. | 28 | 17 | 13 | 1 | .... | .... | .... | .... | .... | 167 | 18 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 2 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 2 | 1 | A. |
| Michigan | 104 | T. | .... | 1 | 5 | .... | .... | .... | 3 | 4 | .... | 1 | 12 | .... | .... | 3 | 17 | 5 | 7 | 1 | 1 | ... | 8 | 10 | 13 | 10 | 6 | .... | .... | 5 | .... | .... | .... | 112 | 18 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 2 | 2 | A. |
| Minnesota | 67 | T. | 2 | 5 | 2 | 4 | 20 | 2 | .... | .... | 2 | .... | .... | .. | 1 | 9 | 7 | 3 | .... | .... | 14 | 7 | 1 | 7 | .... | 1 | .... | 2 | 2 | 4 | .... | 2 | .... | 97 | 21 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | 1 | .... | .... | 1 | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 4 | 4 | A. |
| Mississippi | 43 | T. | 8 | 9 | 8 | 10 | 5 | 6 | 7 | 8 | 9 | 4 | 3 | 2 | 1 | 2 | 5 | 4 | 5 | 8 | 10 | 7 | 6 | 1 | 3 | 10 | 12 | 8 | 4 | 1 | 2 | 4 | 6 | 178 | 31 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Missouri | 95 | T. | .... | 11 | 3 | 1 | 1 | 12 | 20 | 5 | .... | .... | ... | 3 | 4 | 6 | 1 | 15 | 24 | 10 | ... | .... | 1 | .... | 12 | 20 | 1 | .... | 3 | ... | 2 | .... | .... | 166 | 20 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Montana | 40 | T. | .... | .... | 3 | 2 | .... | .... | .... | .... | .... | 4 | 3 | .... | .... | .... | 1 | 8 | 10 | 3 | 5 | 7 | 1 | 1 | 1 | .... | 1 | 2 | ... | .... | 1 | 2 | .... | 55 | 17 | T. |
| | | A. | .... | .... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | .... | .... | 1 | .... | .... | 2 | .. | .... | .... | .... | .... | .... | 1 | .... | .... | .... | 6 | 5 | A. |
| Nebraska | 144 | T. | 7 | ... | .... | 2 | 14 | 6 | 2 | ... | .... | .... | .... | 9 | 4 | ... | 13 | 4 | 3 | 4 | .... | .... | 1 | 2 | 10 | .... | 6 | 1 | ... | .... | .... | .... | .... | 88 | 16 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Nevada | 50 | T. | 1 | 2 | 3 | 5 | 4 | 6 | 2 | .... | .... | .... | 1 | 3 | 4 | 3 | 5 | 1 | .... | .. | 2 | .... | .... | .... | 1 | 1 | 1 | 6 | 1 | 6 | 3 | 1 | .... | 62 | 22 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| New Hampshire | 21 | T. | .... | .... | .... | 8 | 6 | 1 | 7 | .... | .... | .... | .... | .... | .... | .... | 1 | 8 | 7 | .... | .... | .... | 3 | 3 | 12 | 11 | 7 | 1 | .... | .... | .... | .... | .... | 75 | 13 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 2 | .... | .... | .... | .... | .... | .... | 1 | .... | .... | 1 | 1 | .... | .... | .... | .... | 5 | 4 | A. |
| New Jersey | 31 | T. | 10 | 1 | 13 | 7 | 5 | .... | 1 | 13 | 8 | 12 | 2 | 1 | 1 | .... | .... | 4 | 15 | 14 | 8 | .... | .... | .... | 2 | 11 | 2 | .... | .... | .... | .... | .... | .... | 130 | 19 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | 1 | 1 | A. |
| New Mexico | 34 | T. | 2 | 2 | 4 | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 3 | .... | 4 | 3 | 1 | 4 | 3 | 1 | .... | 1 | 2 | 2 | .... | 1 | .... | .... | .... | .... | .... | .... | .... | 42 | 21 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| New York | 113 | T. | 24 | 4 | 23 | 20 | 7 | .... | 4 | 11 | 1 | 1 | .... | 18 | 2 | 5 | 2 | 33 | 25 | 6 | 5 | .... | 1 | 8 | 31 | 40 | 15 | 1 | 1 | 2 | 14 | 2 | 4 | 310 | 28 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| North Carolina | 57 | T. | 7 | 12 | 7 | 4 | 3 | 7 | 3 | 3 | 6 | 9 | 9 | 5 | 4 | 13 | 4 | 5 | 3 | 9 | 13 | 7 | 6 | .... | .... | 2 | 15 | 5 | 7 | 3 | 4 | 1 | 4 | 180 | 29 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| North Dakota | 52 | T. | .... | 3 | .... | 3 | 4 | .... | .... | .... | .... | .... | .... | .... | ... | 3 | 5 | 2 | .... | 1 | 5 | .... | 6 | 5 | 1 | 1 | .... | .... | 3 | 1 | .... | 1 | .... | 44 | 15 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | 1 | 1 | 1 | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 5 | 5 | A. |
| Ohio | 134 | T. | 15 | 7 | 35 | 4 | 1 | .... | 16 | 18 | 1 | .... | 18 | 3 | 2 | 1 | 1 | 17 | 32 | 32 | 4 | .... | .... | 7 | 41 | .... | 3 | .... | .... | 22 | 15 | 1 | .... | 296 | 23 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | .... | .... | .... | .... | 3 | 3 | A. |
| Oklahoma | 21 | T. | 1 | 3 | .... | .... | .... | 1 | 1 | .... | .... | .... | .... | .... | 1 | .... | .... | .... | .... | 1 | .... | .... | .... | .... | .... | .... | 4 | 1 | .... | .... | .... | .... | 1 | 13 | 8 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Oregon | 72 | T. | .... | .... | .... | .... | .... | .... | 2 | 5 | .... | .... | 3 | 3 | 3 | 2 | 3 | .... | 2 | 2 | 2 | 4 | .... | .... | .... | 2 | 1 | .... | 2 | 8 | 1 | 1 | .... | 46 | 17 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Pennsylvania | 105 | T. | 10 | 2 | 32 | 21 | 9 | 3 | 2 | 17 | .... | 6 | .... | 7 | 1 | 4 | .... | 16 | 31 | 24 | 12 | 1 | .... | .... | 2 | 32 | 5 | 5 | .... | .... | 4 | 3 | .... | 249 | 23 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Rhode Island | 8 | T. | .... | .... | 1 | 2 | ... | .... | ... | 2 | 2 | 2 | .... | . | 1 | .. | .... | .... | 5 | 1 | 4 | .... | .... | 1 | 3 | .... | 1 | .... | ... | .. | .... | .... | .... | 25 | 12 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| South Carolina | 40 | T. | .... | 1 | 1 | 2 | 1 | .... | 4 | 1 | .... | .... | 1 | 2 | ... | .... | .... | 1 | ... | .... | 1 | ... | .... | .... | .... | 1 | .... | .... | .... | .... | .... | .... | .... | 16 | 11 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| South Dakota | 56 | T. | 1 | 1 | .... | 6 | 8 | .... | 2 | .... | .... | .... | .... | 1 | 2 | 3 | 1 | 7 | .... | 3 | .... | .... | 2 | 1 | .... | .... | 1 | .... | .... | .... | .... | .... | .... | 39 | 14 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Tennessee | 59 | T. | 6 | 3 | 6 | 2 | .... | 4 | 5 | 6 | 11 | 3 | 4 | 5 | 1 | .... | .... | .... | .... | 6 | 6 | 2 | .... | .... | 4 | 7 | .... | .... | .... | .... | .... | .... | 1 | 82 | 18 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Texas | 89 | T. | 2 | 10 | 6 | 9 | 8 | 4 | 6 | 11 | 2 | 1 | ... | .... | 1 | 2 | 2 | 2 | .... | 3 | 5 | 5 | 5 | 1 | 7 | 4 | 5 | 7 | 7 | 1 | .... | 2 | 4 | 122 | 27 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Utah | 38 | T. | 2 | .... | 7 | 8 | 7 | 1 | .... | 1 | 2 | .... | .... | 2 | 1 | 4 | 6 | 7 | .... | 2 | 1 | 4 | 3 | 6 | .... | .... | .... | 1 | .... | .... | 2 | 5 | 1 | 73 | 21 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Vermont | 14 | T. | 4 | .... | ... | 5 | 3 | .... | 1 | 1 | .... | 1 | .... | .. | 1 | .... | .... | 6 | 5 | 1 | .... | .... | .... | 4 | 7 | 5 | 7 | .... | ... | .... | 1 | .... | .... | 52 | 15 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Virginia | 48 | T. | 1 | 7 | 3 | 5 | 1 | .... | 7 | 3 | 10 | 3 | 2 | 2 | 3 | 4 | 3 | .... | 3 | 1 | 4 | 1 | 1 | .... | 3 | 2 | 9 | .... | 1 | .... | .... | .... | .... | 89 | 23 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Washington | 50 | T. | .... | .... | .... | .... | .... | .... | 1 | .... | .... | .... | .... | .... | .... | .... | 1 | .... | 1 | 8 | 3 | 2 | 5 | .... | .... | .... | .... | 1 | .... | .... | 1 | 1 | 2 | 26 | 11 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| West Virginia | 33 | T. | 2 | 2 | 7 | 3 | .... | .... | 3 | 2 | 2 | 1 | 1 | 4 | .... | .... | .... | 1 | 3 | 5 | 4 | .... | .... | ... | 3 | 4 | 1 | .... | 2 | .... | .... | 1 | .... | 52 | 19 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Wisconsin | 60 | T. | .... | ... | .... | .... | 3 | .... | 1 | ... | .... | 1 | .... | .... | 2 | 16 | 18 | 7 | .... | .... | 1 | .... | 2 | 4 | 3 | .... | .... | .... | .... | .... | .... | .... | .... | .... | 57 | 11 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 2 | .... | .... | .... | 2 | 1 | 1 | .... | .... | .... | 1 | 1 | .... | .... | .... | .... | .... | .... | .... | .... | .... | 8 | 6 | A. |
| Wyoming | 17 | T. | 1 | .... | .... | 2 | 5 | 1 | ... | .... | .... | 1 | .... | 1 | 2 | 1 | 2 | 4 | 2 | 2 | .... | 3 | 4 | .... | .... | .... | .... | 1 | .... | 2 | 4 | 2 | .... | 38 | 18 | T. |
| | | A. | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | .... | 0 | 0 | A. |
| Sums | 2,871 | T | 166 | 160 | 237 | 220 | 172 | 129 | 173 | 223 | 119 | 93 | 92 | 121 | 109 | 145 | 162 | 255 | 319 | 258 | 178 | 108 | 113 | 94 | 277 | 201 | 175 | 105 | 71 | 78 | 88 | 59 | 62 | 4,853 | .... | T. |
| | | A | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 7 | 3 | 0 | 0 | 8 | 3 | 3 | 5 | 0 | 0 | 3 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 2 | 0 | 46 | .... | A. |

TABLE IX.—*Average hourly sunshine (in percentages), August, 1898.*

| Stations. | Instrument. | Percentages for each hour of local mean time ending with the respective hour. A.M. 5 | 6 | 7 | 8 | 9 | 10 | 11 | Noon | P.M. 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Hours of sunshine. Total. Actual. | Possible. | Percent of possible. | Personal estimate. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | *Hours.* | *Hours.* | | |
| Albany, N.Y.* | T. | 11 | 8 | 13 | 33 | 64 | 74 | 79 | 78 | 76 | 76 | 70 | 56 | 39 | 31 | 23 | 31 | 222.2 | 431.3 | 52 | 34 |
| Atlanta, Ga | T. | ..... | 21 | 23 | 26 | 37 | 48 | 44 | 29 | 39 | 35 | 38 | 40 | 28 | 8 | 6 | 0 | 127.6 | 415.8 | 31 | 25 |
| Atlantic City, N.J | P. | ..... | 63 | 67 | 72 | 79 | 83 | 79 | 75 | 80 | 83 | 79 | 73 | 63 | 44 | 36 | 36 | 297.5 | 423.2 | 70 | 57 |
| Baltimore, Md | T. | ..... | 25 | 39 | 68 | 86 | 86 | 88 | 85 | 86 | 84 | 78 | 68 | 59 | 45 | 32 | 27 | 285.6 | 423.2 | 67 | 58 |
| Binghamton, N.Y | T. | 0 | 8 | 14 | 27 | 51 | 68 | 75 | 75 | 70 | 72 | 62 | 49 | 40 | 33 | 27 | 15 | 307.1 | 429.4 | 48 | 43 |
| Bismarck, N. Dak | P. | 32 | 44 | 58 | 70 | 75 | 81 | 84 | 85 | 71 | 71 | 75 | 75 | 69 | 62 | 50 | 56 | 303.2 | 440.0 | 69 | 67 |
| Boston, Mass | T. | 17 | 24 | 34 | 44 | 53 | 63 | 74 | 74 | 75 | 72 | 73 | 65 | 61 | 42 | 33 | 31 | 242.0 | 429.4 | 56 | 46 |
| Buffalo, N.Y. | T. | 11 | 19 | 40 | 63 | 69 | 73 | 82 | 77 | 80 | 75 | 72 | 74 | 71 | 44 | 27 | 12 | 267.3 | 431.3 | 62 | 38 |
| Charleston, S.C. | T. | ..... | 15 | 14 | 15 | 38 | 46 | 40 | 30 | 42 | 49 | 39 | 43 | 34 | 6 | 4 | ..... | 126.2 | 414.0 | 30 | 32 |
| Chattanooga, Tenn | T. | ..... | 35 | 34 | 43 | 63 | 72 | 77 | 77 | 80 | 70 | 74 | 74 | 52 | 41 | 30 | 0 | 248.4 | 417.1 | 60 | 53 |
| Cheyenne, Wyo | P. | 60 | 67 | 75 | 82 | 83 | 83 | 83 | 83 | 84 | 75 | 69 | 60 | 58 | 41 | 20 | 25 | 294.7 | 427.4 | 69 | 62 |
| Chicago, Ill. | T. | 17 | 34 | 41 | 55 | 72 | 68 | 72 | 80 | 82 | 83 | 79 | 73 | 60 | 35 | 37 | 50 | 268.7 | 429.4 | 63 | 63 |
| Cincinnati, Ohio | T. | ..... | 71 | 71 | 75 | 82 | 87 | 86 | 89 | 92 | 88 | 83 | 81 | 75 | 60 | 51 | 55 | 331.2 | 423.2 | 78 | 68 |
| Cleveland, Ohio | T. | 33 | 43 | 45 | 47 | 48 | 59 | 64 | 72 | 77 | 73 | 74 | 72 | 59 | 37 | 32 | 42 | 247.2 | 429.4 | 58 | 53 |
| Columbia, Mo. | T. | ..... | 67 | 63 | 70 | 76 | 84 | 86 | 92 | 96 | 93 | 92 | 83 | 85 | 81 | 68 | 64 | 344.7 | 423.2 | 81 | 60 |
| Columbus, Ohio | T. | 0 | 58 | 63 | 80 | 96 | 96 | 95 | 97 | 95 | 94 | 91 | 91 | 87 | 65 | 61 | 79 | 357.6 | 425.2 | 84 | 54 |
| Denver, Colo | P. | 60 | 79 | 81 | 88 | 85 | 91 | 95 | 95 | 84 | 75 | 70 | 64 | 56 | 43 | 26 | 21 | 314.5 | 425.2 | 74 | 60 |
| Des Moines, Iowa | T. | 33 | 67 | 69 | 71 | 74 | 83 | 81 | 83 | 82 | 84 | 85 | 83 | 80 | 78 | 71 | 46 | 334.3 | 429.4 | 78 | 71 |
| Detroit, Mich. | T. | 20 | 27 | 35 | 54 | 65 | 76 | 79 | 81 | 81 | 80 | 75 | 73 | 58 | 50 | 42 | 31 | 270.9 | 429.4 | 63 | 46 |
| Dodge, Kans | P. | ..... | 71 | 85 | 89 | 87 | 90 | 90 | 88 | 92 | 92 | 95 | 92 | 85 | 87 | 78 | 43 | 368.5 | 422.1 | 87 | 81 |
| Dubuque, Iowa | T. | 5 | 32 | 41 | 57 | 69 | 82 | 87 | 84 | 83 | 85 | 80 | 81 | 72 | 63 | 49 | 31 | 296.7 | 429.4 | 69 | 57 |
| Eastport, Me. | P. | 21 | 11 | 17 | 27 | 33 | 48 | 54 | 51 | 52 | 55 | 63 | 49 | 51 | 45 | 30 | 20 | 182.4 | 435.6 | 42 | 27 |
| Erie, Pa | T. | 33 | 35 | 38 | 40 | 54 | 52 | 65 | 65 | 70 | 67 | 65 | 63 | 48 | 39 | 30 | 23 | 224.7 | 429.4 | 52 | 43 |
| Eureka, Cal. | P | 0 | 0 | 3 | 8 | 13 | 25 | 26 | 38 | 49 | 61 | 55 | 47 | 39 | 40 | 34 | 15 | 135.1 | 427.4 | 32 | 34 |
| Fresno, Cal | T. | ..... | 82 | 86 | 92 | 90 | 93 | 95 | 100 | 100 | 100 | 100 | 99 | 91 | 86 | 78 | 60 | 389.8 | 420.1 | 93 | 86 |
| Galveston, Tex | P. | ..... | 22 | 55 | 76 | 74 | 77 | 67 | 75 | 75 | 68 | 73 | 70 | 70 | 46 | 1 | ..... | 260.1 | 408.0 | 64 | 47 |
| Harrisburg | T. | 0 | 29 | 38 | 50 | 65 | 81 | 85 | 88 | 80 | 83 | 81 | 78 | 65 | 53 | 34 | 21 | 279.4 | 425.2 | 66 | 45 |
| Helena, Mont | T. | 50 | 49 | 67 | 84 | 81 | 79 | 79 | 73 | 79 | 79 | 72 | 67 | 60 | 53 | 31 | 49 | 298.8 | 440.0 | 68 | 66 |
| Huron, S. Dak | T. | 67 | 73 | 74 | 70 | 75 | 78 | 78 | 75 | 76 | 79 | 70 | 64 | 55 | 69 | 71 | 56 | 311.2 | 433.6 | 72 | 63 |
| Idaho Falls, Idaho† | T. | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Indianapolis, Ind | T. | 0 | 42 | 45 | 47 | 50 | 60 | 70 | 75 | 81 | 73 | 71 | 62 | 55 | 41 | 33 | 36 | 246.5 | 425.2 | 58 | 42 |
| Jacksonville, Fla. | T. | ..... | 29 | 34 | 65 | 84 | 94 | 84 | 86 | 76 | 78 | 68 | 52 | 37 | 15 | 1 | ..... | 244.5 | 409.7 | 60 | 45 |
| Kansas City, Mo. | P. | ..... | 54 | 62 | 70 | 74 | 79 | 80 | 82 | 71 | 81 | 81 | 81 | 69 | 65 | 65 | 45 | 307.8 | 423.2 | 73 | 71 |
| Key West, Fla | T. | ..... | 24 | 35 | 64 | 71 | 82 | 87 | 88 | 95 | 95 | 89 | 83 | 71 | 31 | 22 | ..... | 282.8 | 403.3 | 70 | 58 |
| Knoxville, Tenn | T. | ..... | 35 | 44 | 51 | 68 | 74 | 85 | 94 | 95 | 95 | 86 | 84 | 75 | 55 | 44 | 8 | 298.9 | 418.7 | 71 | 59 |
| Little Rock, Ark | T. | ..... | 65 | 67 | 76 | 80 | 91 | 89 | 89 | 84 | 80 | 86 | 77 | 61 | 56 | 43 | 0 | 314.3 | 417.1 | 75 | 55 |
| Los Angeles, Cal | P. | ..... | 41 | 46 | 60 | 71 | 79 | 92 | 99 | 100 | 100 | 100 | 99 | 99 | 97 | 96 | 100 | 354.1 | 415.8 | 85 | 69 |
| Louisville, Ky. | T. | ..... | 73 | 75 | 78 | 85 | 83 | 83 | 84 | 84 | 86 | 85 | 80 | 69 | 53 | 49 | 43 | 322.8 | 422.1 | 76 | 54 |
| Minneapolis, Minn | T. | 32 | 34 | 44 | 62 | 78 | 76 | 79 | 85 | 87 | 82 | 79 | 78 | 66 | 37 | 18 | 7 | 280.1 | 435.6 | 64 | ..... |
| Nashville, Tenn | T. | ..... | 69 | 79 | 84 | 89 | 94 | 94 | 95 | 96 | 94 | 92 | 87 | 90 | 87 | 67 | 50 | 367.2 | 418.7 | 88 | 73 |
| New Orleans, La. | T. | ..... | 6 | 3 | 28 | 39 | 35 | 37 | 34 | 41 | 30 | 26 | 20 | 13 | 1 | 3 | ..... | 97.0 | 409.7 | 24 | 27 |
| New York, N.Y. | T. | 0 | 2 | 17 | 37 | 46 | 62 | 73 | 77 | 74 | 72 | 73 | 61 | 50 | 36 | 18 | 35 | 216.6 | 427.4 | 51 | 42 |
| Northfield, Vt | P. | 33 | 17 | 21 | 35 | 54 | 58 | 59 | 60 | 63 | 61 | 59 | 56 | 42 | 28 | 12 | 10 | 194.0 | 433.6 | 45 | 33 |
| Oklahoma, Okla. | T. | ..... | 75 | 83 | 94 | 97 | 97 | 97 | 94 | 95 | 95 | 90 | 87 | 86 | 87 | 86 | 55 | 378.2 | 417.1 | 91 | 87 |
| Omaha, Nebr | P. | 68 | 38 | 48 | 73 | 76 | 77 | 81 | 78 | 74 | 77 | 75 | 82 | 78 | 65 | 61 | 45 | 301.9 | 427.4 | 71 | 74 |
| Parkersburg, W.Va. | T. | ..... | 16 | 16 | 21 | 50 | 68 | 75 | 77 | 78 | 72 | 69 | 63 | 42 | 15 | 10 | 27 | 207.1 | 423.2 | 49 | 44 |
| Philadelphia, Pa | T. | 100 | 39 | 44 | 43 | 62 | 80 | 87 | 81 | 81 | 82 | 75 | 70 | 59 | 44 | 37 | 29 | 270.3 | 425.2 | 64 | 46 |
| Phenix, Ariz. | P. | ..... | 59 | 68 | 73 | 75 | 81 | 81 | 78 | 88 | 88 | 84 | 82 | 73 | 54 | 38 | ..... | 307.9 | 414.0 | 74 | 60 |
| Pittsburg, Pa. | T. | 0 | 21 | 30 | 43 | 65 | 76 | 82 | 88 | 86 | 83 | 78 | 64 | 63 | 47 | 27 | 25 | 262.9 | 427.4 | 62 | 40 |
| Portland, Me | T. | 7 | 9 | 28 | 50 | 60 | 72 | 78 | 76 | 78 | 83 | 85 | 75 | 66 | 42 | 12 | 8 | 252.7 | 433.6 | 58 | 36 |
| Portland, Oreg. | T. | 35 | 27 | 28 | 34 | 37 | 55 | 68 | 77 | 78 | 79 | 74 | 79 | 77 | 77 | 73 | 91 | 271.2 | 437.6 | 62 | 56 |
| Raleigh, N.C | T. | ..... | 36 | 36 | 46 | 55 | 61 | 80 | 84 | 85 | 79 | 72 | 61 | 51 | 33 | 29 | 28 | 245.2 | 418.7 | 59 | 37 |
| Rochester, N.Y. | T. | 22 | 42 | 45 | 47 | 46 | 55 | 56 | 68 | 62 | 49 | 51 | 42 | 23 | 19 | 18 | 12 | 191.3 | 431.3 | 44 | 41 |
| St. Louis, Mo. | T. | ..... | 41 | 54 | 67 | 82 | 83 | 86 | 85 | 88 | 96 | 96 | 95 | 83 | 71 | 50 | 27 | 328.8 | 423.2 | 78 | 60 |
| St. Paul, Minn | P. | 42 | 39 | 47 | 72 | 79 | 75 | 76 | 71 | 75 | 77 | 72 | 73 | 64 | 52 | 47 | 26 | 284.2 | 435.6 | 65 | 56 |
| Salt Lake City, Utah | P. | 76 | 70 | 72 | 76 | 77 | 79 | 82 | 87 | 88 | 86 | 85 | 81 | 75 | 60 | 41 | 45 | 324.6 | 427.4 | 76 | 49 |
| San Diego, Cal | P. | ..... | 31 | 36 | 33 | 67 | 84 | 92 | 96 | 98 | 97 | 96 | 98 | 95 | 83 | 41 | .... | 317.9 | 414.0 | 77 | 77 |
| San Francisco, Cal. | T. | ..... | 3 | 16 | 36 | 46 | 73 | 91 | 99 | 99 | 99 | 97 | 93 | 86 | 65 | 30 | 0 | 288.3 | 422.1 | 68 | 50 |
| Santa Fe, N. Mex. | P. | ..... | 58 | 70 | 86 | 89 | 89 | 91 | 85 | 80 | 70 | 70 | 51 | 38 | 50 | 46 | 80 | 299.7 | 418.7 | 72 | 55 |
| Savannah, Ga‡ | T. | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Seattle, Wash | T. | 49 | 33 | 32 | 38 | 47 | 52 | 60 | 68 | 76 | 74 | 69 | 70 | 65 | 55 | 49 | 68 | 250.1 | 442.5 | 57 | 62 |
| Spokane, Wash | T. | 91 | 75 | 74 | 81 | 85 | 87 | 91 | 89 | 90 | 85 | 82 | 78 | 75 | 72 | 64 | 77 | 356.8 | 442.5 | 81 | 77 |
| Tacoma, Wash | T. | 50 | 39 | 35 | 37 | 41 | 47 | 62 | 70 | 75 | 74 | 75 | 74 | 65 | 54 | 46 | 48 | 248.9 | 440.0 | 57 | 57 |
| Tampa, Fla | T. | ..... | 69 | 67 | 61 | 71 | 77 | 79 | 71 | 66 | 64 | 47 | 26 | 15 | 12 | 14 | ..... | 216.8 | 406.9 | 53 | 49 |
| Topeka, Kans. | T. | ..... | 59 | 61 | 59 | 71 | 81 | 79 | 83 | 84 | 86 | 81 | 76 | 69 | 60 | 62 | 73 | 306.9 | 423.2 | 73 | ..... |
| Vicksburg, Miss. | T. | ..... | 43 | 42 | 49 | 53 | 68 | 66 | 48 | 50 | 56 | 64 | 51 | 39 | 30 | 24 | ..... | 204.4 | 412.6 | 50 | 50 |
| Washington, D.C. | P. | ..... | 36 | 43 | 56 | 65 | 63 | 64 | 66 | 71 | 78 | 73 | 68 | 66 | 52 | 31 | 18 | 254.1 | 423.2 | 60 | 50 |
| Wilmington, N.C. | T. | ..... | 22 | 23 | 46 | 55 | 52 | 62 | 60 | 55 | 53 | 49 | 39 | 27 | 16 | 8 | 0 | 173.2 | 415.8 | 42 | 31 |
| Yankton, S. Dak | T. | 33 | 46 | 62 | 81 | 89 | 96 | 97 | 97 | 92 | 87 | 84 | 82 | 79 | 76 | 49 | 38 | 344.8 | 431.3 | 80 | 65 |

* All hourly values for twenty-five days only; actual, possible, and percentages for thirty-one days. † Self-register out of order. ‡ Self-register destroyed by hurricane of August 31, and record from 16 to 31 lost.

TABLE X.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during August, 1898, at all stations furnished with self-registering gauges.*

| Stations. | Date. | Total duration. | | Total am't of precipitation. | Excessive rate. | | Amount before excessive began. | Depths of precipitation (in inches) during periods of time as indicated. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | From— | To— | | Began— | Ended— | | 5 min. | 10 min. | 15 min. | 20 min. | 25 min. | 30 min. | 35 min. | 40 min. | 45 min. | 50 min. | 60 min. | 80 min. | 100 min. | 120 min. |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | | | | | | | | | | | | |
| Albany, N. Y. | 23 | 4.25 p.m. | 7.20 p.m. | 0.50 | 4.25 p.m. | 4.35 p.m. | 0.00 | 0.38 | 0.48 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Do | 24 | 2.45 p.m. | 6.45 p.m. | 0.90 | 3.02 p.m. | 3.20 p.m. | 0.18 | 0.43 | 0.57 | 0.60 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Atlanta, Ga. | 12 | 1.45 a.m. | 10.50 a.m. | 1.06 | 8.35 a.m. | 9.05 a.m. | 0.32 | 0.16 | 0.35 | 0.51 | 0.67 | 0.78 | 0.87 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Atlantic City, N.J. | 8 | 7.45 p.m. | 11.10 p.m. | 0.86 | 10.30 p.m. | 10.46 p.m. | 0.34 | 0.08 | 0.21 | 0.39 | 0.44 | 0.52 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Do | 10-11 | 5.30 p.m. | 6.00 a.m. | 1.93 | 7.55 p.m. | 8.10 p.m. | 0.79 | 0 24 | 0.38 | 0.46 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Baltimore, Md. | 1 | 3.10 p.m. | 4.00 p.m. | 1.44 | 3.15 p.m. | 3.40 p.m. | T. | 0.46 | 0.78 | 1.16 | 1.36 | 1.42 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Do | 4-5 | 11.40 p.m. | D. N. | 1.47 | 11.50 p.m. | 12.25 a.m. | 0.03 | 0.05 | 0.29 | 0.48 | 0.78 | 0.94 | 1.02 | 1.09 | 1.12 | 1.17 | ..... | ..... | ..... | ..... | ..... |
| Binghamton, N. Y. | 3-4 | 7.30 p.m. | D. N. | 1.16 | 9.05 p.m. | 9.59 p.m. | 0.27 | 0.06 | 0.18 | 0.25 | 0.32 | 0.40 | 0.46 | 0.56 | 0.60 | 0.64 | 0.71 | 0.77 | ..... | ..... | ..... |
| Do | 29-30 | 8.01 p.m. | D N. | 0.89 | 9.53 p.m. | 10.20 p.m. | 0 27 | 0.16 | 0 35 | 0.40 | 0.45 | 0.52 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Bismarck, N. Dak. | 21-22 | 10.50 p.m. | 1.35 a.m. | 1.00 | 11.32 p.m. | 11.59 p.m. | 0.05 | 0.37 | 0.66 | 0.70 | 0.75 | 0.90 | 0.95 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Boston, Mass. | 17 | 4.50 p.m. | 7.25 p.m. | 1.03 | 5.00 p.m. | 5.35 p.m. | T. | 0.05 | 0.22 | 0.26 | 0.29 | 0.63 | 0.89 | 0.93 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Buffalo, N. Y. | 17 | 1.10 a.m. | 1.55 a.m. | 0.52 | 1.37 a.m. | 1.40 a.m. | T. | 0.23 | 0.39 | 0.42 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Do | 17 | 2.58 p.m. | 3.40 p.m. | 0.40 | 2.59 p.m. | 3.21 p.m. | T. | 0.13 | 0.29 | 0.30 | 0.37 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Cairo, Ill. | 7-8 | 9.30 p.m. | D. N. | 1.05 | 10.59 p.m. | 11.25 p.m. | 0.32 | 0.28 | 0.43 | 0.49 | 0.53 | 0.58 | 0.60 | 0.61 | 0.63 | 0.65 | ..... | ..... | ..... | ..... | ..... |
| Charleston, S. C. | 21 | 4.45 a.m. | 9.24 a.m. | 1.17 | 5.50 a.m. | 6.20 a.m. | 0.22 | 0.04 | 0.22 | 0.40 | 0.70 | 0.86 | 0.92 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Do | 27 | 6.12 a.m. | 8.50 a.m. | 1.08 | 7.30 a.m. | 8.35 a.m. | 0.13 | 0.12 | 0.16 | 0.24 | 0.25 | 0.26 | 0.28 | 0.33 | 0.48 | 0.60 | 0.63 | 0.71 | 0.96 | ..... | ..... |
| Do | 27 | 12.53 p.m. | 8.55 p.m. | 1.41 | 1.00 p.m. | 1.40 p.m. | 0.01 | 0.21 | 0.31 | 0.48 | 0.59 | 0.63 | 0.68 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Do | 28 | 10.18 p.m. | 11.10 p.m. | 0.54 | 10.20 p.m | 10.45 p.m. | T. | 0.15 | 0.34 | 0.41 | 0.42 | 0.53 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Chicago, Ill * | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Cincinnati, Ohio | 18 | 1.55 p.m. | 3.10 p.m. | 0.69 | 2.10 p.m. | 2.30 p.m. | 0.06 | 0.06 | 0.18 | 0.42 | 0.50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Cleveland, Ohio | 24 | ..... | ..... | 0.65 | ..... | ..... | ..... | ..... | ..... | ..... | 0.39 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Colun bia, Mo. | 2 | ..... | ..... | 0.26 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.23 | ..... | ..... | ..... |
| Columbus, Ohio | 1 | 9.16 a.m. | 11.30 a.m. | 1.22 | 10.02 a.m. | 10.45 a.m. | 0.10 | 0.22 | 0.32 | 0.40 | 0.50 | 0.60 | 0.71 | 0.86 | 0.92 | 0.96 | ..... | ..... | ..... | ..... | ..... |
| Do | 3 | 1.15 p.m. | 6.00 p.m. | 1.93 | 1.45 p.m. | 2.20 p.m. | 0.02 | 0.25 | 0.61 | 0.85 | 0.99 | 1.04 | 1.23 | 1.51 | 1.54 | 1.56 | ..... | ..... | ..... | ..... | ..... |
| Denver, Colo. | 5 | ..... | ..... | 0.15 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.15 | ..... | ..... | ..... | ..... |
| Des Moines, Iowa | 2 | ..... | ..... | 0.58 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.46 | ..... | ..... | ..... | ..... |
| Detroit, Mich | 18 | ..... | ..... | 0.49 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.41 | ..... | ..... | ..... | ..... |
| Dodge, Kans | 6-7 | 6.50 p.m. | 4.40 a.m. | 2.04 | 12.18 a.m. | 12.55 a.m. | 0.12 | 0.20 | 0.55 | 1.00 | 1.11 | 1.18 | 1.26 | 1.33 | 1.37 | ..... | ..... | ..... | ..... | ..... | ..... |
| Duluth, Minn. | 6 | ..... | ..... | 1.17 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.52 | ..... | ..... | ..... | ..... |
| Eastport, Me. | 5 | 3 05 p.m | 4.35 p.m. | 0.85 | 3.28 p.m. | 4.20 p.m. | 0.10 | 0.06 | 0.15 | 0.25 | 0.30 | 0.35 | 0.39 | 0.50 | 0.60 | 0.64 | 0.72 | 0.79 | ..... | ..... | ..... |
| Erie, Pa. | 17 | 6.10 a.m. | 7.30 a.m. | 0.63 | 6.35 a.m. | 6.55 a.m. | 0.01 | 0.18 | 0.43 | 0.55 | 0.61 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Fresno, Cal.† | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Galveston, Tex. | 9 | 7.37 a.m. | 9.26 a.m. | 1.26 | 8.00 a.m. | 8.35 a.m | 0.04 | 0.16 | 0.44 | 0.76 | 0.88 | 1.02 | 1.10 | 1.16 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Hannibal, Mo | 14 | ..... | ..... | 0.32 | ..... | ..... | ..... | ..... | 0.32 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Harrisburg, Pa. | 3 | 5 17 p.m. | 11.50 p.m. | 2.82 | 5.45 p.m. | 6.30 p.m. | 0.32 | 0.11 | 0.28 | 0.65 | 0.74 | 0.88 | 1.11 | 1.31 | 1.50 | 1.64 | ..... | ..... | ..... | ..... | ..... |
| Do | 18 | 6.10 p.m. | 7.58 p.m. | 0.73 | 6.12 p.m. | 6.20 p.m. | T. | 0.42 | 0.55 | 0.61 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Hatteras, N. C. | 16 | 7.30 a.m | 11.55 a.m. | 1.07 | 8.40 a.m. | 9.05 a.m. | 0.05 | 0 10 | 0.35 | 0.65 | 0.80 | 0.90 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Huron, S. Dak. | 4 | 10.48 p.m. | 11.55 p.m. | 0.36 | 11.02 p.m. | 11.15 p.m. | 0.01 | 0.13 | 0.28 | 0.33 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Idaho Falls, Idaho | 30 | ..... | ..... | 0.22 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.16 | ..... | ..... | ..... | ..... |
| Indianapolis, Ind. | 18 | 7.10 a.m. | 10.05 a.m. | 0.69 | 7.25 a.m. | 7.40 a.m. | 0.03 | 0.08 | 0.28 | 0.41 | 0.45 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Jacksonville, Fla. | 10 | 5.15 p.m. | 7.06 p.m. | 0.73 | 6.15 p.m. | 6.33 p.m. | 0.15 | 0.16 | 0.28 | 0.42 | 0.51 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Do. | 11 | 3.50 p.m. | 9.15 p.m. | 1.31 | 4.57 p.m. | 5.23 p.m. | 0.30 | 0.34 | 0.50 | 0.59 | 0.63 | 0 70 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Jupiter, Fla. | 1-2 | 7.58 a.m. | D N. | 2.68 | 12.46 a.m. | 12.53 a.m. | 1.75 | 0.13 | 0.32 | 0.41 | 0.43 | 0.44 | 0.55 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Kansas City, Mo. | 2 | 9.05 a.m. | 3.55 p.m. | 1.76 | 1.42 p.m. | 2.20 p.m. | 0.55 | 0.10 | 0.15 | 0.27 | 0.43 | 0.59 | 0.74 | 0.87 | 0.92 | 0.97 | 1.00 | 1.05 | ..... | ..... | ..... |
| Do | 17 | 12.40 a.m. | 4.40 a.m. | 2.72 | 1.02 a.m. | 2.55 a.m. | 0.22 | 0.14 | 0.25 | 0.45 | 0.52 | 0.58 | 0.53 | 0.55 | 0.59 | 0.66‡ | 0.71‡ | 0.89‡ | 1.26‡ | 1.61 | 1.97 |
| Key West, Fla* | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Knoxville, Tenn. | 18 | 7.50 a.m. | 9.55 a.m. | 1.09 | 8.10 a.m. | 9.20 a.m. | 0.04 | 0.05 | 0.10 | 0.20 | 0.35 | 0.40 | 0.45 | 0.52 | 0.60 | 0.66 | 0.71 | 0.83 | 1.02 | ..... | ..... |
| Lincoln, Nebr. | 6 | 12.57 a.m. | 4.38 a.m. | 1.98 | 1.20 a.m. | 2.05 a.m. | 0.32 | 0.10 | 0.14 | 0.24 | 0.31 | 0.41 | 0.51 | 0.69 | 0.89 | 1.03 | 1.05 | 1.10 | ..... | ..... | ..... |
| Do. | 15-16 | 10.54 p.m. | D. N. | 0.71 | 11.20 p.m. | 11.50 p.m. | 0.01 | 0.10 | 0.19 | 0.49 | 0.55 | 0.59 | 0.65 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Little Rock, Ark. | 8 | 7.58 p.m. | 9.00 p.m. | 0.57 | 7.55 p.m. | 8.10 p.m. | 0.01 | 0.25 | 0.42 | 0.50 | 0.54 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Los Angeles, Cal. | 11 | ..... | ..... | T. | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Louisville, Ky. | 8 | 1.50 p.m. | 8.45 p.m. | 3.33 | 1.55 p.m.<br>2.42 p.m. | 2.27 p.m.<br>3.35 p.m. | 0.01<br>..... | 0.11<br>0.37 | 0.34<br>0.58 | 0.49<br>0.82 | 0.54<br>1.32 | 0.65<br>1.42 | 0.79<br>1.57 | 0.84<br>1.81 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Memphis, Tenn. | 9 | ..... | ..... | 0.89 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.60 | ..... | ..... | ..... | ..... |
| Milwaukee, Wis. | 16 | 3.10 a.m. | 5.10 a.m. | 0.82 | 3.30 a.m. | 3.45 a.m. | 0.10 | 0.20 | 0.30 | 0.46 | 0.51 | 0.55 | 0.58 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Do | 21 | 4.37 p.m. | 9.48 p.m. | 2.32 | 6.10 p.m. | 7.10 p.m. | 0.14 | 0.08 | 0.18 | 0.27 | 0.41 | 0.64 | 0.99 | 1.15 | 1.27 | 1.41 | 1.61 | 1.81 | 1.96 | ..... | ..... |
| Montgomery, Ala. | 4 | 4.18 p.m. | 6.50 p.m. | 1.08 | 4.32 p.m. | 5.12 p.m. | 0.01 | 0.12 | 0.18 | 0.39 | 0.52 | 0.71 | 0.81 | 0.86 | 0.91 | ..... | ..... | ..... | ..... | ..... | ..... |
| Do. | 10 | 10.45 a.m. | 12.30 p.m. | 0.60 | 10.55 a.m. | 11.08 a.m. | 0.05 | 0.10 | 0.38 | 0.44 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Do | 21 | 7.45 p.m. | 8.40 p.m. | 0.80 | 7.50 p.m. | 8.15 p.m. | 0.03 | 0.16 | 0.30 | 0.43 | 0.56 | 0.65 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Nantucket, Mass. | 19 | ..... | ..... | 0.64 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.36 | ..... | ..... | ..... | ..... |
| Nashville, Tenn. | 8-9 | 7.47 p.m. | 9.40 a.m. | 4.66 | 8.55 p.m.<br>9.47 p m | 9.30 p.m.<br>10.47 p.m. | 0.48<br>..... | 0.10<br>0.07 | 0.22<br>0.10 | 0.31<br>0.18 | 0.51<br>0.31 | 0.69<br>0.40 | 0.83<br>0.54 | 0.92<br>0.72 | 0.92 | 1.04 | 1.15 | 1.31 | ..... | ..... | ..... |
| | | | | | 5.05 a.m. | 5.45 a.m. | ..... | 0.10 | 0.24 | 0.45 | 0.63 | 0.72 | 0.82 | 0.94 | 0.99 | ..... | ..... | ..... | ..... | ..... | ..... |
| New Orleans, La. | 3 | 2.55 p.m. | 4.45 p.m | 1.06 | 3.05 p.m. | 3.35 p.m. | 0.01 | 0.21 | 0.27 | 0.34 | 0.53 | 0.82 | 1.01 | 1.03 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Do | 5 | 11.00 a.m. | 1.35 p.m. | 2.07 | 12.27 p.m. | 1.10 p.m. | 0.25 | 0.15 | 0.22 | 0.26 | 0.46 | 0.71 | 0.92 | 1.16 | 1.41 | 1.56 | 1.69 | 1.82 | ..... | ..... | ..... |
| New York, N. Y. | 24 | 7.40 p.m. | 8.20 p.m. | 0.28 | 7.48 p.m. | 7.53 p.m. | 0.02 | 0.25 | 0.26 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Norfolk, Va. | 14 | 12.30 p.m. | 4.15 p.m. | 4.82 | 2.08 p.m.<br>2.58 p.m. | 2.58 p.m.<br>3.55 p.m. | 0.09<br>..... | 0.22<br>2.44 | 0.45<br>2.69 | 0.67<br>2.91 | 1.03<br>3.09 | 1.34<br>3.34 | 1.56<br>3.59 | 1.72<br>3.84 | 1.84<br>3.99 | 2.04<br>4.19 | 2.14<br>4.44 | 4.71 | 4.73 | ..... | ..... |
| Do | 29 | 5.28 a.m. | 11.45 p.m. | 0.84 | 5.30 p.m. | 5.40 p.m. | T. | 0.41 | 0.57 | 0.63 | 0.68 | 0.72 | 0.74 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Northfield, Vt. | 1 | 5.10 a.m. | 11.14 a.m | 1.50 | 6.33 a.m. | 6.43 a.m. | 0.60 | 0.15 | 0.26 | 0.30 | 0.32 | 0.35 | 0.44 | 0.48 | 0.51 | 0.53 | 0.55 | 0.61 | 0.75 | ..... | ..... |
| Oklahoma, Okla. | 7 | 7.00 p.m. | 7.40 p m | 0.62 | 7.00 p.m. | 7.20 p.m. | 0.00 | 0.18 | 0.37 | 0.43 | 0.57 | 0.57 | 0.57 | 0.57 | 0.62 | ..... | ..... | ..... | ..... | ..... | ..... |
| Omaha, Nebr. | 6 | D. N. | 8.32 a.m. | 1.21 | 2.10 a.m. | 2.25 a.m. | T. | 0.20 | 0.30 | 0.43 | 0.45 | 0.49 | 0.50 | 0.54 | 0.55 | 0.56 | 0.58 | 0.62 | ..... | ..... | ..... |
| Parkersburg, W. Va. | 3 | 1.00 p.m. | 4.15 p.m. | 1.10 | 1.43 p.m. | 2.28 p.m. | 0.10 | 0.10 | 0.19 | 0.32 | 0.43 | 0.54 | 0.58 | 0.74 | 0.78 | 0.87 | 0.88 | 0.91 | ..... | ..... | ..... |
| Philadelphia, Pa. | 3 | 10.50 a.m. | 1.20 p.m. | 5.48 | 10.50 a.m.<br>11.40 a.m. | 11.40 a.m.<br>12.35 p.m. | 0.00<br>..... | 0.08<br>3.25 | 0.28<br>3.58 | 0.60<br>3.74 | 0.90<br>3.87 | 1.24<br>4.33 | 1.84<br>4.69 | 2.14<br>4.90 | 2.52<br>4.92 | 2.75<br>5.00 | 2.95<br>5.22 | 5.43 | ..... | ..... | ..... |
| Pittsburg, Pa. | 18-19 | ..... | ..... | 0.87 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.34 | ..... | ..... | ..... |
| Portland, Me. | 24 | 5.30 p.m. | 9.07 p.m. | 0.91 | 6.00 p.m. | 6.15 p.m. | 0.27 | 0.05 | 0.14 | 0.21 | 0.26 | 0.39 | 0.59 | 0.74 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Portland, Oreg. | 19 | ..... | ..... | 0.13 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.08 | ..... | ..... | ..... |
| Raleigh, N. C. | 17 | 3.07 p.m. | 6.30 p.m. | 0.68 | 3.23 p.m. | 3.40 p.m. | 0.01 | 0.07 | 0.15 | 0.42 | 0.48 | 0.49 | 0.52 | 0.54 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Do | 21 | 7.20 p.m. | 8.15 p.m. | 0.49 | 7.28 p.m. | 7.40 p.m. | 0.03 | 0.16 | 0.36 | 0.41 | 0.44 | 0.46 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Richmond, Va. | 10 | 5.32 p.m. | D. N. | 2.77 | 5.32 p.m.<br>6.22 p.m. | 6.22 p.m.<br>6.52 p.m. | 0.00<br>..... | 0.30<br>1.00 | 0.61<br>1.20 | 0.92<br>1.35 | 0.66<br>1.46 | 0.69<br>1.60 | 0.76<br>1.77 | 0.79<br>1.81 | 0.79 | 0.86 | 0.94 | ..... | ..... | ..... | ..... |
| Do | 14 | 12.35 p.m. | 2.50 p.m. | 1.24 | 1.20 p.m. | 2.20 p.m. | 0.01 | 0.04 | 0.11 | 0.17 | 0.26 | 0.35 | 0.40 | 0.52 | 0.71 | 0.91 | 1.01 | 1.18 | 1.23 | ..... | ..... |
| Rochester, N. Y. | 17 | 9.25 a.m. | 2.55 p.m. | 1.26 | 11.18 a.m. | 11.58 a.m. | 0.20 | 0 16 | 0.17 | 0.18 | 0.19 | 0.20 | 0.25 | 0.50 | 0.68 | 0.75 | ..... | ..... | ..... | ..... | ..... |
| Do | 24 | 12.50 p.m. | 3.20 p.m. | 1.92 | 1.07 p.m. | 2.07 p.m. | 0.04 | 0.25 | 0.40 | 0.47 | 0.55 | 0.68 | 0.81 | 0.91 | 0.99 | 1.04 | 1.09 | 1.21 | 1.33 | 1.61 | 1.82 |
| St. Louis, Mo. | 2 | 12.25 p.m. | 3.35 p.m. | 0.59 | 1.00 p.m. | 1.20 p.m. | 0.02 | 0.04 | 0.23 | 0.41 | 0.47 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| St. Paul, Minn. | 5 | 6.15 p.m. | D. N. | 1.27 | 6.18 p.m. | 6.48 p.m. | T. | 0.49 | 0.71 | 0.79 | 0.88 | 0.98 | 1.04 | 1.06 | 1.09 | 1.10 | 1.11 | 1.12 | 1.14 | 1.18 | 1.21 |
| Do | 14 | 8.25 p.m. | 10.42 p.m. | 0.73 | 10.07 p.m. | 10.27 p.m. | 0.01 | 0.48 | 0.69 | 0.71 | 0.72 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Salt Lake City, Utah. | 30 | ..... | ..... | 0.48 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.48‡ | ..... | ..... | ..... |
| San Diego, Cal† | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| San Francisco, Cal. | 2 | ..... | ..... | T. | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | T. | ..... | ..... | ..... |
| Savannah, Ga. | 1 | 2.58 p.m. | 4.15 p.m. | 0.76 | 3.06 p.m. | 3.42 p.m. | 0.01 | 0.11 | 0.15 | 0.23 | 0.41 | 0.53 | 0.67 | 0.73 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Do | 4 | 3.20 p.m. | 6.10 p.m. | 0.80 | 3.28 p.m. | 3.53 p.m. | 0.01 | 0.10 | 0.39 | 0.45 | 0.60 | 0.74 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Do | 16-17 | 8.20 p.m. | 6.05 a.m. | 4.14 | 1.40 a.m.<br>3.05 a.m. | 2.00 a.m.<br>4.05 a.m. | 2.06<br>0.27 | 0.20<br>0.06 | 0.34<br>0.18 | 0.41<br>0.33 | 0.52<br>0.43 | 0.50 | 0.54 | 0.60 | 0.76 | 0.86 | 1.02 | 1.18 | ..... | ..... | ..... |
| Do | 27 | 11.10 a.m. | 7.30 p.m. | 3.24 | • | • | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2.00 |
| Do | 30-31 | 9.25 p.m. | § | 9.31 | • | • | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Seattle, Wash. | 31 | ..... | ..... | 0 08 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.02 | ..... | ..... | ..... |
| Spokane, Wash. | 31 | ..... | ..... | 0.53 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.21 | ..... | ..... | ..... |
| Tampa, Fla. | 4 | 6.50 p.m. | 10.00 p.m. | 1.55 | • | • | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1.47 | ..... | ..... | ..... |
| Do | 6 | 4.33 p.m. | 6.30 p.m. | 3.91 | 4.33 p.m | 5.10 p.m. | 0.00 | 0.30 | 0.60 | 1.05 | 1.65 | 2.20 | 2.65 | 2.95 | 3.10 | 3.15 | 3.24 | 3.32 | 3.60 | 3.91 | ..... |

TABLE X.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

| Stations. | Date. | Total duration. From— | Total duration. To— | Total am't of precipitation. | Excessive rate. Began— | Excessive rate. Ended— | Amount before excessive began. | Depths of precipitation (in inches) during periods of time as indicated. 5 min. | 10 min. | 15 min. | 20 min. | 25 min. | 30 min. | 35 min. | 40 min. | 45 min. | 50 min. | 60 min. | 80 min. | 100 min. | 120 min. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | | | | | | | | | | | | |
| Tampa, Fla | 22 | 12.40 p. m. | 8.30 p. m. | 3.08 | 2.15 p. m § | 2.35 p. m § | 0.45 | 0.30 | 0.45 | 0.60 | 0.67 | 0.69 | 0.70 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | | | | | 5.10 p. m § | 6.20 p. m § | 0.23 | 0 17 | 0.26 | 0.37 | 0.42 | 0.45 | 0.50 | 0.55 | 0.64 | 0.80 | 1.02 | 1.32 | 1.52 | ..... | ..... |
| Vicksburg, Miss | 4 | 4 45 p. m. | 7.05 p. m. | 0.99 | 4.54 p. m | 5.24 p m. | T. | 0.16 | 0.37 | 0.54 | 0.66 | 0.72 | 0.76 | 0.77 | 0.80 | 0.86 | 0.90 | 0.94 | ..... | ..... | ..... |
| Washington, D. C | 12 | 9.20 a. m. | 11.00 p. m. | 4.96 | 11.20 a. m | 12.10 p. m | T. | 0.02 | 0.06 | 0.10 | 0.24 | 0.38 | 0.55 | 0.60 | 0.68 | 1.00 | 1.05 | ..... | ..... | ..... | ..... |
| | | | | | 12.10 p. m | 1.00 p. m | | 1.10 | 1.22 | 1.30 | 1.31 | 1.31 | 1.32 | 1.36 | 1.41 | 1.42 | 1.43 | ..... | ..... | ..... | ..... |
| | | | | | 1.00 p. m | 1.50 p. m | | 1.45 | 1.47 | 1.47 | 1.48 | 1.48 | 1.49 | 1.52 | 1.67 | 1.72 | 1.72 | ..... | ..... | ..... | ..... |
| | | | | | 1.50 p. m | 2.40 p. m | | 1.73 | 1.73 | 1.74 | 1.76 | 1.81 | 1.87 | 1.87 | 1.88 | 1.89 | 1.90 | ..... | ..... | ..... | ..... |
| | | | | | 2.40 p. m | 3.30 p. m | | 1.92 | 1.97 | 2.03 | 2.06 | 2.11 | 2.18 | 2.23 | 2.29 | 2.37 | 2.45 | ..... | ..... | ..... | ..... |
| | | | | | 3.30 p. m | 4.20 p. m | | 2.47 | 2.54 | 2.58 | 2.61 | 2.61 | 2.62 | 2.69 | 2.76 | 2.80 | 2.80 | ..... | ..... | ..... | ..... |
| | | | | | 4.20 p. m | 5.10 p. m | | 2.81 | 2.82 | 2.82 | 2.82 | 2.83 | 2.86 | 2.96 | 3.04 | 3.23 | 3.30 | ..... | ..... | ..... | ..... |
| | | | | | 5.10 p m | 6.00 p m | | 3.41 | 3.50 | 3.53 | 3 55 | 3.57 | 3.59 | 3.60 | 3.63 | 3.69 | 3.70 | ..... | ..... | ..... | ..... |
| | | | | | 6.00 p. m | 6.50 p m | | 3.71 | 3.74 | 3.80 | 3.88 | 3.95 | 4.00 | 4.04 | 4.10 | 4.20 | 4.24 | ..... | ..... | ..... | ..... |
| | | | | | 6.50 p. m | 7.40 p. m | | 4.31 | 4.39 | 4.45 | 4.50 | 4.55 | 4.60 | 4.65 | 4.68 | 4.72 | 4.76 | 4.85 | 4.92 | ..... | ..... |
| Wilmington, N. C | 11 | 12.48 p. m. | 2.50 p. m. | 0.41 | 1.39 p m | 1.48 p. m. | 0.05 | 0.17 | 0 34 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Do | 21 | 1.50 p. m. | 3.00 p m. | 0.56 | 2.13 p. m | 2.23 p. m. | 0.22 | 0.21 | 0.32 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Yankton, S. Dak. | 5-6 | ..... | ..... | 1.08 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 0.49 | ..... | ..... | ..... |

*Record incomplete. †No precipitation during the month. ‡Partly estimated; instrument not working properly. §Ended D. N. August 31-September 1.

TABLE XI.—*Excessive precipitation, by stations, for August, 1898.*

| Stations. | Monthly rainfall 10 inches, or more. | Rainfall 2.50 inches, or more, in 24 hours. | | Rainfall of 1 inch, or more, in one hour. | | |
|---|---|---|---|---|---|---|
| | | Amt. | Day. | Amt. | Time. | Day. |
| *Alabama* | *Inches.* | *Inches.* | | *Ins.* | *h.m.* | |
| Alco | 17.48 | 4.52 | 29 | ..... | ..... | ..... |
| Bermuda | 14.21 | 3.70 | 24 | .... | ..... | ..... |
| Daphne | 14.52 | ... ... | ..... | ..... | ..... | ..... |
| Elba | 10.90 | ..... | ..... | ..... | ..... | ..... |
| Eufaula | 11.99 | ..... | ..... | ..... | ..... | ..... |
| Evergreen | 13.62 | ..... | ..... | ..... | ..... | ..... |
| Fort Deposit | 10.22 | .... .. | ..... | ..... | ..... | ..... |
| Goodwater | ..... | 2.75 | 11 | ..... | ..... | ..... |
| Healing Springs | 11.30 | ... ... | ..... | ..... | ..... | ..... |
| Marion | 12.20 | 2.90 | 10 | ..... | ..... | ..... |
| Mobile | 12.35 | 3.18 | 10–11 | ..... | ..... | ..... |
| Mount Willing | ..... | 2.50 | 12 | ..... | ..... | ..... |
| Newton | ..... | 3.31 | 3 | ..... | ..... | ..... |
| Oneonta | ..... | ..... | ..... | 1.69 | 0 25 | 25 |
| Rockmills | 13.89 | ..... | ..... | ..... | ..... | ..... |
| Sturdevant | ..... | 2.77 | 25 | ..... | ..... | ..... |
| Tuscumbia | ..... | 2.80 | 4 | ..... | ..... | ..... |
| Do | ..... | 2.50 | 18–19 | ..... | ..... | ..... |
| *Arkansas.* | | | | | | |
| Beebranch | ..... | 2.50 | 8 | ..... | ..... | ..... |
| Corning | ..... | 2.98 | 8 | ..... | ..... | ..... |
| Dallas | ..... | 2.73 | 1 | ..... | ..... | ..... |
| Elon | ..... | ..... | ..... | 1.50 | 0 30 | 19 |
| Fort Smith | ..... | 4.50 | 7–8 | 3.25 | 2 00 | 7–8 |
| Fulton | ..... | 2.54 | 1 | ..... | ..... | ..... |
| Jonesboro | ..... | 4.00 | 9 | ..... | ..... | ..... |
| Keesees Ferry | ..... | 3.30 | 8 | 1.21 | 0 45 | 2 |
| La Crosse | ... ... | 2.50 | 24 | ..... | ..... | ... |
| Mena | ..... | 3.40 | 1 | ..... | ..... | ..... |
| Monticello | ..... | .... ... | ..... | 1.97 | 1 05 | 4 |
| Moore | ..... | ..... | ..... | 1.20 | 1 00 | 18 |
| Newport | ..... | ..... | ..... | 2.20 | 2 00 | 18 |
| Osceola | ..... | 2.81 | 9 | ..... | ..... | ..... |
| Ozark | ..... | 6.00 | 8 | ..... | ..... | ..... |
| Silver Springs | ..... | 3.28 | 7–8 | ..... | ..... | ..... |
| Stuttgart | ..... | ..... | ..... | 1.03 | 1 00 | 10 |
| Wiggs | ..... | 2.52 | 24 | ..... | ..... | ..... |
| *Colorado.* | | | | | | |
| Yuma | ..... | 3.00 | 1 | 3.00 | 0 45 | 1 |
| *Connecticut.* | | | | | | |
| Colchester | ..... | 2.85 | 11 | ..... | ..... | ..... |
| Waterbury | ..... | 2.50 | 10–11 | 1.00 | 0 30 | 17 |
| *Delaware.* | | | | | | |
| Newark | ..... | 4.16 | 3–4 | ..... | ..... | ..... |
| *District of Columbia.* | | | | | | |
| Distributing Reservoir | ..... | 5.98 | 12 | ..... | ..... | ..... |
| Receiving Reservoir | ..... | 5.44 | 12 | ..... | ..... | ..... |
| Washington | ..... | 4.96 | 12 | 1.30 | 1 05 | 12 |
| West Washington | ..... | 4.85 | 12 | ..... | ..... | ..... |
| *Florida.* | | | | | | |
| Archer | ..... | 2.70 | 5 | 2.70 | 1 00 | 5 |
| Brooksville | 13.44 | ..... | ..... | 1.25 | 0 55 | 8 |
| Carrabelle | 19.90 | 4.10 | 2–3 | ..... | ..... | ..... |
| Do | ..... | 8.30 | 27–28 | ..... | ..... | ..... |
| Clermont | 13.48 | 2.90 | 10 | ..... | ..... | ..... |
| Crawfordville | 20.56 | 4.06 | 3 | ..... | ..... | ..... |
| Do | ..... | 9.03 | 28–29 | ..... | ..... | ..... |
| DeFuniak Springs | 22.98 | 2.80 | 11 | ..... | ..... | ..... |
| Do | ..... | 2.95 | 29 | ..... | ..... | ..... |
| Earnestville | 20.16 | 3.33 | 10 | ..... | ..... | ..... |
| Do | ..... | 3.45 | 23 | ..... | ..... | ..... |
| Enstis | 10.95 | ..... | ..... | ..... | ..... | ..... |
| Federal Point | 10.59 | ..... | ..... | ..... | ..... | ..... |
| Grasmere | 12.20 | 2.55 | 23 | ..... | ..... | ..... |
| Haywood | 11.12 | ..... | ..... | ..... | ..... | ..... |
| Huntington | 10.79 | 2.78 | 10 | ..... | .. | ..... |
| Jupiter | ..... | 2.68 | 1–2 | ..... | ..... | ..... |
| Key West | ..... | ..... | ..... | 1.47 | 1 00 | 8 |
| Kissimmee | 11.41 | ..... | ..... | ..... | ..... | ..... |
| Lake Butler | ..... | ..... | ..... | 1.70 | 1 10 | 5 |
| Lake City | ..... | ..... | ..... | 1.70 | 1 00 | 23 |
| Lemon City | ..... | 2.90 | 1 | ..... | ..... | ..... |
| Manatee | 18.48 | 6.57 | 2 | .... | ..... | ..... |
| Myers | 11.62 | 3.00 | 8 | ..... | ..... | ..... |
| New Smyrna | 11.19 | 4.82 | 16 | ..... | ..... | ..... |
| Ocala | 11.89 | 2.68 | 20 | 2.68 | 1 30 | 20 |
| Orange City | 10.95 | ..... | ..... | ..... | ..... | ..... |
| Orange Park | 18.01 | ..... | ..... | ..... | ..... | ..... |
| Orlando | 10.93 | ..... | ..... | ..... | ..... | ..... |
| Pensacola | 18.58 | 2.70 | 27 | ..... | ..... | ..... |
| Do | ..... | 5.39 | 28–29 | ..... | ..... | ..... |
| Plant City | 15.06 | ..... | ..... | ..... | ..... | ..... |
| St. Andrews | 31.26 | 4.88 | 2–3 | ..... | ..... | ..... |
| Do | ..... | 16.55 | 27–30 | ..... | ..... | ..... |
| St. Francis | ..... | 2.78 | 10 | ..... | ..... | ..... |
| Stephensville | 16.46 | 3.10 | 26 | 3.10 | 3 00 | 26 |
| Switzerland | 11.32 | 3.15 | 16 | ..... | ..... | ..... |
| Tallahassee | 15.43 | 5.20 | 3 | ..... | ..... | ..... |
| Do | ..... | 3.54 | 28 | ..... | ..... | ..... |
| Tampa | 17.83 | 3.16 | 1–2 | 1.47 | 0 55 | 4 |
| Do | ..... | 3.91 | 6 | 3.90 | 1 40 | 6 |
| Do | ..... | 3.98 | 21–22 | 1.50 | 1 10 | 22 |
| Tarpon Springs | 16.05 | 2.94 | 2 | 1.15 | 1 00 | 8 |
| Wausau | 20.68 | 6.69 | 3 | ..... | ..... | ..... |
| *Georgia.* | | | | | | |
| Albany | 11.60 | 3.40 | 3 | ..... | ..... | ..... |
| Americus | 10.25 | ..... | ..... | ..... | ..... | ..... |
| Brag | 23.02 | 2.86 | 16 | ..... | ..... | ..... |
| Do | ..... | 5.93 | 31 | ..... | ..... | ..... |
| Bellville | 10.48 | ..... | ..... | ..... | ..... | ..... |

TABLE XI.—*Excessive precipitation*—Continued.

| Stations. | Monthly rainfall 10 inches, or more | Rainfall 2.50 inches, or more, in 24 hours. | | Rainfall of 1 inch, or more, in one hour. | | |
|---|---|---|---|---|---|---|
| | | Amt. | Day. | Amt. | Time. | Day. |
| *Georgia*—Continued. | *Inches.* | *Inches.* | | *Ins.* | *h.m.* | |
| Clayton | 11.40 | 2.50 | 4 | ..... | ..... | ..... |
| Columbus | 11.98 | 3.10 | 4 | 1.70 | 1 30 | 27 |
| Covington | 10.69 | 2.60 | 4 | 1.62 | 0 30 | 21 |
| Crescent | .... ... | 2.65 | 16 | ... ... | ... ... | ..... |
| Dahlonega | 10.69 | 2.65 | 4 | ..... | ..... | ..... |
| Diamond | 11.74 | 3.71 | 4 | ..... | ..... | ..... |
| Elberton | 12.15 | 3.98 | 31 | ..... | ..... | ..... |
| Fleming | 28.60 | 3.16 | 13 | ..... | ..... | ..... |
| Do | ..... | 5.52 | 17 | ..... | ..... | ..... |
| Do | ..... | 8.58 | 28 | 5.62 | 3 00 | 28 |
| Franklin | 13.29 | 3.02 | 10 | ..... | ..... | ..... |
| Do | ..... | 2.53 | 26 | ..... | ..... | ..... |
| Gainesville | ..... | 2.70 | 3–4 | 1.75 | 1 00 | 26 |
| Gillsville | ..... | 2.87 | 3 | ..... | ..... | ..... |
| Harrison | 16.41 | 4.00 | 25 | 1.48 | 1 00 | 21 |
| Hephzibah | 11.80 | 3.50 | 28 | ..... | ..... | ..... |
| Jesup | 18.13 | 6.40 | 27–28 | ..... | ..... | ..... |
| Lagrange | 12.71 | ..... | ..... | ..... | ..... | ..... |
| Lumpkin | 12.44 | 3.10 | 3 | ..... | ..... | ..... |
| Do | ..... | 3.83 | 27–28 | ..... | ..... | ... .. |
| Mauzy | 13.16 | 2.59 | 6 | ..... | ..... | ... .. |
| Morgan | 14.75 | 2.75 | 3 | ..... | ..... | ..... |
| Do | ..... | 3.20 | 27 | ..... | ..... | ..... |
| Mount Vernon | 13.50 | 6.50 | 27–28 | ..... | ..... | ..... |
| Newnan | 14.59 | 4.56 | 27 | ..... | .. | ..... |
| Poulan | 13.82 | 2.67 | 20 | .. | ..... | .. ... |
| Do | ..... | 2.86 | 26 | ..... | ..... | ..... |
| Savannah | 22.79 | 5.44 | 16–17 | 1.18 | 1 00 | 17 |
| Do | ..... | 3.74 | 27 | 2.00 | 1 20 | 27 |
| Do | ..... | 7.31 | 30–31 | ..... | ..... | ..... |
| Talbotton | 11.06 | 3.03 | 3 | ..... | ..... | ..... |
| Do | ..... | 3.56 | 26 | ..... | .. | ..... |
| Tallapoosa | 10.82 | ..... | ..... | ..... | ..... | ..... |
| Toccoa | ..... | ..... | ... | 1.65 | 1 00 | 13 |
| Waynesboro | 13.60 | 3.00 | 16 | ..... | ..... | ..... |
| Do | ..... | 4.65 | 31 | ..... | ..... | ..... |
| *Illinois.* | | | | | | |
| Ashton | ..... | 3.16 | 15 | ..... | ..... | ..... |
| Cambridge | ..... | 5.15 | 15–16 | ..... | ..... | ..... |
| Cordova | ..... | 4.00 | 15–16 | ..... | ..... | ..... |
| Dixon | ..... | 4.21 | 15–16 | ..... | ..... | ..... |
| Elgin | ..... | 2.65 | 3 | ..... | ..... | ..... |
| Galva | ..... | 4.64 | 15–16 | ..... | ..... | ..... |
| Glenwood | ..... | 2.81 | 15 | ..... | ..... | ..... |
| Griggsville | ..... | 3.60 | 14 | ..... | ..... | ..... |
| Henry | ..... | 3.50 | 15–16 | ..... | ..... | ..... |
| Kishwaukee | ..... | 4.11 | 15 | ..... | ..... | ..... |
| Knoxville | 10.18 | 5.40 | 16 | ..... | ..... | ..... |
| Laharpe | 10.40 | 3.40 | 7 | ..... | ..... | ..... |
| Do | ..... | 5.45 | 14 | ..... | ..... | ..... |
| Lanark | ..... | 3.45 | 15–16 | 1.35 | 0 45 | 23 |
| McLeansboro | ..... | 2.60 | 8 | ..... | ..... | ..... |
| Monmouth | ..... | 4.90 | 15–16 | ..... | ..... | ..... |
| Reynolds | ..... | 5.45 | 16 | ..... | ..... | ..... |
| Rockford | ..... | 3.90 | 15 | ..... | ..... | ..... |
| Roundgrove | ..... | 3.45 | 16 | ..... | ..... | ..... |
| Scalesmound | ..... | 2.80 | 15 | ..... | ..... | ..... |
| Sycamore | ..... | 2.76 | 15 | ..... | ..... | ..... |
| Tiskilwa | ..... | 4.06 | 15–16 | ..... | ..... | ..... |
| Walnut | ..... | 3.74 | 15–16 | ..... | ..... | ..... |
| Winchester | ..... | 3.90 | 14 | ..... | ..... | ..... |
| Winnebago | ... .... | 3.50 | 14 | 1.00 | 1 00 | 15 |
| *Indiana.* | | | | | | |
| Evansville | ..... | ..... | ..... | 1.10 | 1 00 | 8 |
| Jasper | ..... | 3.30 | 18 | ..... | ..... | ..... |
| Jeffersonville | ..... | 2.68 | 8 | ..... | ..... | ..... |
| Knightstown | ..... | ..... | ..... | 1.09 | 0 30 | 24 |
| Lafayette | ..... | ..... | ..... | 1.42 | 0 15 | 3 |
| Princeton | ..... | 3.05 | 8 | 2.70 | 0 55 | 8 |
| Topeka | ..... | ..... | ..... | 1.76 | 0 25 | 3 |
| *Iowa.* | | | | | | |
| Alta | ..... | 4.70 | 5 | ..... | ..... | ..... |
| Ames (near) | ..... | 2.50 | 19–20 | ..... | ..... | ..... |
| Belleplaine | ..... | 4.15 | 20 | ..... | ..... | ..... |
| Bonaparte | 10.55 | 2.55 | 2 | 2.55 | 2 00 | 2 |
| Do | ..... | 2.66 | 14 | 1.75 | 1 00 | 6 |
| Clinton | ..... | 3.01 | 16 | ..... | ..... | ..... |
| Desoto | ..... | ..... | ..... | 1.45 | 1 00 | 13 |
| Grundy Center | ..... | 2.75 | 20 | ..... | ..... | ..... |
| Hampton | ... .... | 4.00 | 19–20 | ..... | ..... | . .... |
| Humboldt | ..... | 2.84 | 5–6 | ..... | ..... | ..... |
| Keosauqua | ..... | 4.08 | 14 | ..... | ..... | ..... |
| Larrabee | ..... | 3.25 | 5–6 | ..... | ..... | ..... |
| Maple Valley | ..... | 4.20 | 6 | .... | ..... | ..... |
| Mooar | ..... | 3.20 | 17 | ..... | ..... | ..... |
| Odeboldt | ..... | 5.08 | 4 | ..... | ..... | ..... |
| Olin | .... ... | 3.26 | 15–16 | ..... | ..... | ..... |
| Ottumwa | ..... | 2.75 | 14 | 2.75 | 1 15 | 14 |
| Ovid | ..... | 4.67 | 6 | ..... | ..... | ..... |
| Pioneer | ..... | 4.30 | 6 | ..... | ..... | ..... |
| Plover | ..... | 3.54 | 5–6 | ..... | ..... | ..... |
| Ruthven | ..... | 3.00 | 20 | ..... | ..... | . .... |
| Sac City | ..... | 3.50 | 5–6 | ..... | ..... | ..... |
| Sioux City | ..... | 2.52 | 5–6 | ..... | ..... | ..... |
| Spirit Lake | ..... | 3.50 | 19 | ..... | ..... | . .... |
| Wapello | ..... | 5.16 | 15–16 | ..... | ..... | ..... |
| Westbend | ..... | 2.95 | 5–6 | ..... | ..... | ..... |
| Wilton Junction | ..... | 4.38 | 15–16 | ..... | ..... | ..... |
| *Kansas.* | | | | | | |
| Anthony | ..... | 4.00 | 7 | ..... | ..... | ..... |

TABLE XI.—*Excessive precipitation*—Continued.

| Stations. | Monthly rainfall 10 inches, or more. | Rainfall 2.50 inches, or more, in 24 hours. | | Rainfall of 1 inch, or more, in one hour. | | |
|---|---|---|---|---|---|---|
| | | Amt. | Day. | Amt. | Time. | Day. |
| *Kansas*—Continued. | *Inches.* | *Inches.* | | *Ins.* | *h.m.* | |
| Augusta | | 2.70 | 7 | | | |
| Columbus | | 2.81 | 17–18 | | | |
| Dodge | | | | 1.15 | 0 18 | 7 |
| Halstead | | 4.73 | 6–7 | | | |
| Hutchinson | | 4.15 | 6 | | | |
| Norwich | | 5.01 | 5 | | | |
| Olathe | | 2.64 | 17 | | | |
| Osage City | | 4.01 | 17 | | | |
| Pratt | | 4.30 | 7 | | | |
| Rome | | 4.40 | 6–7 | | | |
| Winfield | | 3.00 | 6–7 | | | |
| *Kentucky.* | | | | | | |
| Alpha | | 8.62 | 8–9 | | | |
| Bardstown | | | | 1.22 | 1 00 | 9 |
| Burnside | | | | 1.47 | 1 00 | 25 |
| Catlettsburg | | 3.72 | 8–9 | | | |
| Louisville | | 3.68 | 8–9 | 2.66 | 1 23 | 8 |
| Maysville | | 4.05 | 9 | | | |
| Middlesboro | | 3.17 | 9–10 | | | |
| Owenton | | 2.62 | 8 | | | |
| Richmond | | 2.84 | 8–9 | | | |
| Scott | | | | 1.00 | 0 15 | 8 |
| Vanceburg | | 2.75 | 9 | | | |
| *Louisiana.* | | | | | | |
| Abbeville | | 3.35 | 10 | | | |
| Amite | | 2.80 | 11 | | | |
| Clinton | | 3.16 | 10 | | | |
| Covington | 13.76 | | | 2.40 | 1 10 | 27 |
| Franklin | 11.60 | 3.04 | 9 | | | |
| Hammond | 10.78 | 3.45 | 7 | | | |
| Jeanerette | 11.97 | | | | | |
| Lafayette | 10.99 | 3.75 | 11 | | | |
| Lake Providence | | 3.30 | 10 | | | |
| Lawrence | 10.27 | | | | | |
| New Orleans | | | | 1.01 | 0 30 | 3 |
| Do | | | | 1.80 | 0 58 | 5 |
| Plaquemine | | | | 2.40 | 2 00 | 9 |
| Do | | | | 1.25 | 0 30 | 30 |
| Port Eads | 13.39 | 3.09 | 26–27 | | | |
| Sugartown | | 2.75 | 7 | | | |
| Venice | 14.39 | 4.30 | 9 | | | |
| Do | | 2.84 | 26–27 | | | |
| Wallace | 10.17 | 3.49 | 7 | | | |
| White Sulphur Springs | | | | 1.74 | 1 05 | 3 |
| *Maine.* | | | | | | |
| Mayfield | | 2.94 | 24–25 | | | |
| *Maryland.* | | | | | | |
| Baltimore | | | | 1.42 | 0 25 | 1 |
| Do | | | | 1.20 | 0 47 | 4–5 |
| Collegepark | | 2.76 | 12 | | | |
| Cumberland | | 3.00 | 4 | | | |
| Darlington | 10.39 | 3.89 | 24 | | | |
| Frederick | | | | 1.37 | 0 28 | 18 |
| Frostburg | | 2.54 | 4 | | | |
| Grantsville | | 2.88 | 9 | | | |
| Green Spring Furnace | | 2.52 | 4 | | | |
| Westernport | | 2.88 | 4 | | | |
| Woodstock | | 2.53 | 4 | | | |
| *Massachusetts.* | | | | | | |
| Attleboro | | 2.72 | 11 | | | |
| Bedford | | 3.16 | 19 | | | |
| Cohasset | | | | 2.00 | 1 30 | 18 |
| Concord | | 2.90 | 10–11 | | | |
| Fallriver | | 3.87 | 10–11 | | | |
| Fiskdale | | 2.89 | 10 | | | |
| Fitchburg | | 2.69 | 18–19 | | | |
| Groton | | 3.08 | 18–19 | | | |
| Jefferson | 11.89 | 3.89 | 10–11 | 2.00 | 1 15 | 17 |
| Leicester Hill | | 2.87 | 10 | | | |
| Do | | 2.69 | 19 | | | |
| Long Plain | | 4.08 | 10–11 | | | |
| Monson | 10.00 | 3.75 | 11 | | | |
| New Bedford | | 4.67 | 10–11 | | | |
| Plymouth | | 2.92 | 10–11 | | | |
| Provincetown | | 3.70 | 10–11 | | | |
| Somerset | | 3.23 | 10–11 | | | |
| South Clinton | 10.72 | 3.40 | 10–11 | | | |
| Westboro | | 2.78 | 10–11 | 1.87 | 1 30 | 17 |
| Woods Hole | | 2.80 | 10–11 | | | |
| *Michigan.* | | | | | | |
| Lake City | | 3.50 | 22 | | | |
| Mount Pleasant | | | | 1.45 | 0 30 | 21 |
| Siginaw | | 3.53 | 3 | | | |
| Traverse City | | 4.30 | 22–23 | | | |
| *Minnesota.* | | | | | | |
| Bingham Lake | | 3.70 | 5 | | | |
| Bird Island | | 2.93 | 5 | | | |
| Faribault | | 3.10 | 5 | | | |
| Lake City | | | | 1.39 | 1 00 | 14 |
| Lake Jennie | | 3.17 | 5 | | | |
| Lakeside | | | | 1.21 | 0 30 | 5 |
| Luverne | | 2.60 | 8 | | | |
| Montevideo | | 4.25 | 5 | | | |
| New Ulm | | 3.17 | 5 | | | |
| St. Paul | | 2.62 | 5 | 1.05 | 0 32 | 5 |
| Willmar | | 3.85 | 5 | | | |
| *Mississippi.* | | | | | | |
| Bay St. Louis | 12.49 | 2.62 | 9 | | | |
| Biloxi | 12.53 | 3.12 | 27 | | | |
| Brookhaven | | 2.90 | 9 | | | |

TABLE XI.—*Excessive precipitation*—Continued.

| Stations. | Monthly rainfall 10 inches, or more. | Rainfall 2.50 inches, or more, in 24 hours. | | Rainfall of 1 inch, or more, in one hour. | | |
|---|---|---|---|---|---|---|
| | | Amt. | Day. | Amt. | Time. | Day. |
| *Mississippi*—Continued. | *Inches.* | *Inches.* | | *Ins.* | *h.m.* | |
| Canton | | 5.16 | 9–10 | | | |
| Edwards | | | | 2.20 | 2 00 | 25 |
| Fayette | | 2.50 | 25 | | | |
| French Camps | | | | 1.82 | 1 00 | 4 |
| Greenville | | 3.81 | 9 | 3.79 | 1 45 | 9 |
| Lake | | | | 1.68 | 1 20 | 9 |
| Logtown | 11.38 | | | | | |
| Macon | | 3.00 | 25 | | | |
| Magnolia | | | | 2.37 | 1 45 | 11 |
| Meridian | | | | 1.93 | 1 55 | 6 |
| Mosspoint | 16.95 | 2.55 | 9 | | | |
| Palo Alto | | | | 2.03 | 2 00 | 9 |
| Woodville | | | | 1.80 | 1 15 | 4 |
| Yazoo City | | 2.55 | 10–11 | | | |
| *Missouri.* | | | | | | |
| Brunswick | | 2.50 | 7 | | | |
| East Lynne | | 2.83 | 17 | | | |
| Eightmile | | 2.98 | 17 | | | |
| Farmersville | | 2.77 | 24 | | | |
| Harrisonville | | 2.85 | 17 | | | |
| Kansas City | | 2.81 | 16–17 | 1.05 | 1 00 | 2 |
| Do | | | | 1.92 | 1 52 | 17 |
| Lexington | | 3.82 | 17 | | | |
| Liberty | | 4.10 | 17 | 4.00 | 1 50 | 17 |
| Mineral Spring | | 5.19 | 6–8 | | | |
| New Madrid | | 6.23 | 6–8 | | | |
| Oto | | 5.00 | 7–8 | | | |
| Seymour | | 2.94 | 8 | | | |
| Springfield | | 2.92 | 17–18 | | | |
| Willow Springs | | 3.00 | 25 | | | |
| *Nebraska.* | | | | | | |
| Arapaho | | | | 1.95 | 1 15 | 17 |
| Callaway | | 2.50 | 5 | | | |
| Columbus | | 3.33 | 6 | | | |
| Ewing | | 3.80 | 5 | | | |
| Fairfield | | 2.55 | 5 | | | |
| Fairmont | | 2.55 | 6 | | | |
| Geneva | | 3.68 | 5–6 | | | |
| Genoa | | 3.36 | 5–6 | | | |
| Gothenburg | | | | 1.25 | 0 20 | 16 |
| Grand Island | | 2.50 | 5–6 | | | |
| Harvard | | 3.17 | 5 | | | |
| Hastings | | 4.60 | 5–6 | | | |
| Lexington | | | | 1.35 | 0 15 | 5 |
| Lincoln | | | | 1.37 | 1 00 | 6 |
| Lyons | | 3.56 | 6 | | | |
| Schuyler | | 3.20 | 6 | | | |
| Strang | | 2.75 | 5 | | | |
| Tekamah | | 3.25 | 5–6 | | | |
| Westpoint | | 3.30 | 6 | | | |
| Wilber | | 2.95 | 6 | | | |
| Willard | | | | 1.00 | 0 20 | 15 |
| *Nevada.* | | | | | | |
| San Antonio | | 2.70 | 28 | | | |
| *New Hampshire.* | | | | | | |
| Bethlehem | | | | 1.56 | 1 50 | 17 |
| Littleton | | | | 1.46 | 0 25 | 17 |
| Do | | | | 1.17 | 0 40 | 24 |
| Stratford | | | | 1.50 | 0 28 | 4 |
| Warner | | 2.94 | 19 | | | |
| *New Jersey.* | | | | | | |
| Camden | | 5.50 | 3 | 5.40 | 1 45 | 3 |
| Charlotteburg | | 2.55 | 9–10 | | | |
| College Farm | | 2.78 | 18–19 | | | |
| Toms River | | 4.46 | 1 | 4.46 | 4 10 | 1 |
| *New Mexico.* | | | | | | |
| Engle | | 4.40 | 7 | 4.40 | 1 45 | 7 |
| Laluz | | | | 1.27 | 0 55 | 7 |
| Raton | | | | 1.00 | 0 35 | 9 |
| Santa Fe | | | | 1.42 | 1 00 | 18 |
| *New York.* | | | | | | |
| Bedford | | 2.54 | 10 | | | |
| Carmel | | | | 2.35 | 2 00 | 1 |
| Garrattsville | 10.14 | 3.30 | 16–17 | | | |
| Gloversville | | | | 1.24 | 0 50 | 23 |
| Greenwich | | | | 1.16 | 0 30 | 23 |
| Honeymead Brook | | 3.14 | 3–4 | | | |
| Little Falls (Conduit Inlet) | 13.79 | 2.87 | 24–25 | | | |
| Middletown | | 3.60 | 23–24 | 3.08 | 2 00 | 23 |
| Mohonk Lake | | 2.60 | 4 | | | |
| Oneonta | 13.05 | 3.01 | 4 | | | |
| Poughkeepsie | | | | 2.01 | 2 00 | 23 |
| Rochester | | 2.53 | 24–25 | 1.20 | 1 00 | 24 |
| Rome | 10.98 | | | | | |
| Westpoint | | 2.50 | 19–20 | | | |
| *North Carolina.* | | | | | | |
| Abshers | 10.01 | 2.63 | 7 | | | |
| Beaufort | 10.54 | | | | | |
| Bryson City | | 2.80 | 4 | | | |
| Chapelhill | 14.48 | 5.18 | 19 | | | |
| Charlotte | | 3.00 | 19–20 | 1.10 | 1 00 | 19 |
| Flatrock | 11.35 | 2.61 | 4 | | | |
| Goldsboro | | | | 2.10 | 0 35 | 29 |
| Hatteras | | | | 1.00 | 1 00 | 16 |
| Horsecove | 16.93 | 5.00 | 4 | 1.20 | 0 32 | 5 |
| Linville | | 4.00 | 4 | | | |
| Louisburg | | | | 1.65 | 0 45 | 2 |
| Marion | 10.84 | 2.74 | 19 | 1.63 | 1 00 | 18 |
| Do | | | | 2.74 | 0 25 | 19 |
| Moncure | | 2.88 | 20 | | | |

TABLE XI.—*Excessive precipitation.*—Continued.

| Stations. | Monthly rainfall 10 inches, or more. | Rainfall 2.50 inches, or more, in 24 hours. | | Rainfall of 1 inch, or more, in one hour. | | |
|---|---|---|---|---|---|---|
| | | Amt. | Day. | Amt. | Time. | Day. |
| *North Carolina*—Continued. | *Inches.* | *Inches.* | | *Ins.* | *h.m.* | |
| Monroe | 11.65 | 2.80 | 20 | ..... | ..... | ..... |
| Murphy | ..... | 2.55 | 3-4 | ..... | ..... | ..... |
| Sloan | ..... | ..... | ..... | 1.10 | 0 30 | 10 |
| Soapstone Mount | ..... | ..... | ..... | 1.90 | 1 00 | 21 |
| Tarboro | ..... | 3.20 | 30 | ..... | ..... | ..... |
| *North Dakota.* | | | | | | |
| Fullerton | ..... | ..... | ..... | 1.20 | 1 00 | 21 |
| Lisbon | ..... | 3.32 | 21-22 | ..... | ..... | ..... |
| *Ohio.* | | | | | | |
| Clarksville | ..... | 2.70 | 24 | ..... | ..... | ..... |
| Columbus | ..... | ..... | ..... | 1.02 | 1 00 | 1 |
| Do | ..... | ..... | ..... | 1.50 | 0 35 | 3 |
| Gratiot | ..... | 3.02 | 18 | ..... | ..... | ..... |
| Greenhill | ..... | 2.50 | 18 | ..... | ..... | ..... |
| Killbuck | ..... | ..... | ..... | 1.22 | 1 00 | 18 |
| Lancaster | ..... | ..... | ..... | 1.08 | 0 15 | 24 |
| Orangeville | ..... | 2.80 | 18 | ..... | ..... | ..... |
| Vanceburg | ..... | 3.08 | 8-9 | ..... | ..... | ..... |
| Vanwert | ..... | ..... | ..... | 1.96 | 1 00 | 17 |
| Walnut | ..... | 2.70 | 18 | 1.36 | 0 40 | 1 |
| *Oklahoma.* | | | | | | |
| Fort Sill | ..... | 2.95 | 2 | ..... | ..... | ..... |
| Guthrie | ..... | 2.70 | 2 | ..... | ..... | ..... |
| Hennessey | ..... | 2.95 | 2 | ..... | ..... | ..... |
| Hopeton | ..... | 3.30 | 7 | ..... | ..... | ..... |
| Jefferson | ..... | 5.88 | 6 | ..... | ..... | ..... |
| Kingfisher | ..... | 3.69 | 2 | ..... | ..... | ..... |
| Newkirk | ..... | 6.70 | 7 | ..... | ..... | ..... |
| *Pennsylvania.* | | | | | | |
| Aqueduct | ..... | 2.89 | 4 | ..... | ..... | ..... |
| Chambersburg | ..... | 2.52 | 4 | ..... | ..... | ..... |
| Coatesville | ..... | ..... | ..... | 1.32 | 0 30 | 24 |
| Duncannon | ..... | 2.85 | 4 | ..... | ..... | ..... |
| East Mauch Chunk | ..... | 2.55 | 9-10 | ..... | ..... | ..... |
| Everett | ..... | 2.60 | 10 | ..... | ..... | ..... |
| Girardville | ..... | 3.70 | 4 | ..... | ..... | ..... |
| Greensboro | ..... | ..... | ..... | 1.00 | 1 00 | 18 |
| Harrisburg | ..... | 2.82 | 3 | 1.67 | 0 48 | 3 |
| Lebanon | 10.43 | 4.42 | 4 | ..... | ..... | ..... |
| Lewisburg | ..... | 5.61 | 3-4 | 2.00 | 1 00 | 3 |
| Do | ..... | ..... | ..... | 2.00 | 1 00 | 4 |
| Philadelphia | ..... | 5.89 | 3-4 | 5.43 | 1 44 | 3 |
| Reedsville | ..... | 3.70 | 3-4 | ..... | ..... | ..... |
| Ridgway | ..... | 2.55 | 18 | ..... | ..... | ..... |
| Shinglehouse | ..... | 2.71 | 18-19 | ..... | ..... | ..... |
| York | ..... | 2.50 | 10 | ..... | ..... | ..... |
| *Rhode Island.* | | | | | | |
| Block Island | ..... | 2.70 | 10-11 | ..... | ..... | ..... |
| Bristol | ..... | 4.18 | 10-11 | ..... | ..... | ..... |
| Pawtucket | ..... | 2.94 | 10-11 | ..... | ..... | ..... |
| *South Carolina.* | | | | | | |
| Allendale | 17.90 | 7.45 | 31 | 1.60 | 1 10 | 26 |
| Anderson | ..... | 3.10 | 18 | ..... | ..... | ..... |
| Camden | 13.55 | 2.92 | 12 | ..... | ..... | ..... |
| Do | ..... | 3.06 | 29 | ..... | ..... | ..... |
| Central | 12.03 | 3.44 | 13 | ..... | ..... | ..... |
| Charleston | 11.34 | 2.63 | 27-28 | ..... | ..... | ..... |
| Columbia | ..... | 3.29 | 25-26 | ..... | ..... | ..... |
| Conway | ..... | 3.25 | 12 | ..... | ..... | ..... |
| Effingham | 12.12 | ..... | ..... | ..... | ..... | ..... |
| Gillisonville | 24.42 | 4.15 | 26-27 | ..... | ..... | ..... |
| Do | ..... | 10.43 | 30-31 | ..... | ..... | ..... |
| Greenville | 10.10 | ..... | ..... | ..... | ..... | ..... |
| Kingstree | 11.18 | ..... | ..... | ..... | ..... | ..... |
| Pinopolis | 14.85 | ..... | ..... | ..... | ..... | ..... |
| Port Royal | 24.68 | 3.18 | 27 | ..... | ..... | ..... |
| Do | ..... | 10.82 | 31 | ..... | ..... | ..... |
| St. Stephens | 14.66 | 3.05 | 10 | 3.05 | 3 00 | 10 |
| society Hill | ..... | 2.95 | 29 | ..... | ..... | ..... |
| summerville | 11.27 | ..... | ..... | ..... | ..... | ..... |

TABLE XI.—*Excessive precipitation*—Continued.

| Stations. | Monthly rainfall 10 inches, or more. | Rainfall 2.50 inches, or more, in 24 hours. | | Rainfall of 1 inch, or more, in one hour. | | |
|---|---|---|---|---|---|---|
| | | Amt. | Day. | Amt. | Time. | Day. |
| *South Carolina*—Continued. | *Inches.* | *Inches.* | | *Ins.* | *h.m.* | |
| Trial | 15.20 | 4.02 | 11-12 | 2.42 | 1 00 | 11 |
| Do | ..... | 2.67 | 30 | ..... | ..... | ..... |
| Yemassee | 10.35 | ..... | ..... | ..... | ..... | ..... |
| *South Dakota.* | | | | | | |
| Flandreau | ..... | ..... | ..... | 1.19 | 0 45 | 19 |
| *Tennessee* | | | | | | |
| Byrdstown | ..... | 3.71 | 8-9 | ..... | ..... | ..... |
| Carthage | ..... | 7.27 | 9-10 | ..... | ..... | ..... |
| Decatur | ..... | ..... | ..... | 1.68 | 1 00 | 18 |
| Elizabethton | ..... | ..... | ..... | 1.25 | 0 20 | 7 |
| Florence | ..... | 4.04 | 8-9 | ..... | ..... | ..... |
| Franklin | ..... | 4.17 | 9 | ..... | ..... | ..... |
| Lafayette | ..... | 3.25 | 9 | ..... | ..... | ..... |
| Liberty | ..... | 3.60 | 9 | ..... | ..... | ..... |
| McKenzie | ..... | 2.78 | 9 | ..... | ..... | ..... |
| Madison | ..... | 3.18 | 9 | ..... | ..... | ..... |
| Nashville | ..... | 5.10 | 8-9 | 2.25 | 1 47 | 8 |
| Do | ..... | ..... | ..... | 1.07 | 1 00 | 9 |
| Newport | ..... | ..... | ..... | 1.25 | 1 00 | 8 |
| Nunnelly | ..... | 3.69 | 8-9 | ..... | ..... | ..... |
| Pope | ..... | 2.65 | 9 | ..... | ..... | ..... |
| Rogersville | ..... | 3.01 | 9-10 | ..... | ..... | ..... |
| Sewanee | ..... | 2.70 | 8-9 | ..... | ..... | ..... |
| Springdale | ..... | 2.75 | 10 | ..... | ..... | ..... |
| Sylvia | ..... | 2.95 | 9 | ..... | ..... | ..... |
| Tazewell | ..... | 2.75 | 9-10 | ..... | ..... | ..... |
| Union City | ..... | 2.80 | 9 | ..... | ..... | ..... |
| *Texas.* | | | | | | |
| Alvin | ..... | ..... | ..... | 1.00 | 1 00 | 2 |
| Anna | ..... | ..... | ..... | 2.20 | 2 00 | 1 |
| Beeville | ..... | ..... | ..... | 1.90 | 1 30 | 21 |
| Brazoria | ..... | 2.90 | 5 | 2.90 | 1 55 | 5 |
| Do | ..... | ..... | ..... | 1.50 | 1 10 | 27 |
| Brenham | ..... | ..... | ..... | 1.12 | 0 45 | 5 |
| Columbia | ..... | 3.10 | 5 | 3.10 | 1 30 | 5 |
| Dublin | ..... | 2.53 | 7-8 | ..... | ..... | ..... |
| Emory | ..... | ..... | ..... | 1.87 | 1 00 | 2 |
| Estelle | ..... | 2.98 | 25 | 2.93 | 1 00 | 25 |
| Forestburg | ..... | ..... | ..... | 1.65 | 1 30 | 25 |
| Galveston | ..... | ..... | ..... | 1.10 | 0 30 | 9 |
| Jasper | ..... | 3.00 | 8 | 3.00 | 2 00 | 8 |
| Do | ..... | 2.52 | 9-10 | ..... | ..... | ..... |
| Junction | ..... | ..... | ..... | 2.00 | 1 00 | 26 |
| *Virginia.* | | | | | | |
| Bigstone Gap | ..... | 3.80 | 9-10 | ..... | ..... | ..... |
| Burkes Garden | ..... | 2.60 | 4 | ..... | ..... | ..... |
| Charlottesville | 10.61 | ..... | ..... | ..... | ..... | ..... |
| Dale Enterprise | ..... | 2.52 | 4 | ..... | ..... | ..... |
| Dwale | ..... | 2.00 | 24 | ..... | ..... | ..... |
| Hot Springs | ..... | 4.50 | 4 | ..... | ..... | ..... |
| Lexington | ..... | 2.86 | 4 | ..... | ..... | ..... |
| Norfolk | ..... | 5.00 | 14 | 4.74 | 1 52 | 14 |
| Richmond | ..... | 2.95 | 10-11 | 1.79 | 1 22 | 10 |
| Do | ..... | ..... | ..... | 1.18 | 1 00 | 14 |
| Spottsville | ..... | 4.82 | 14 | 3.60 | 2 00 | 14 |
| Do | ..... | ..... | ..... | 2.00 | 2 00 | 19 |
| Stephens City | 10.40 | 2.68 | 10 | ..... | ..... | ..... |
| Wytheville | ..... | 2.63 | 4 | ..... | ..... | ..... |
| *West Virginia.* | | | | | | |
| Beverly | 10.06 | 2.70 | 4 | ..... | ..... | ..... |
| Charleston | ..... | 2.81 | 10 | ..... | ..... | ..... |
| Eastbank | ..... | 3.21 | 10 | ..... | ..... | ..... |
| Huntington | ..... | 3.50 | 8-9 | ..... | ..... | ..... |
| Marlinton | ..... | 2.85 | 10 | ..... | ..... | ..... |
| Martinsburg | ..... | 2.65 | 4 | ..... | ..... | ..... |
| Philippi | 11.57 | ..... | ..... | ..... | ..... | ..... |
| Powellton | ..... | ..... | ..... | 1.13 | 0 15 | 25 |
| *Wisconsin.* | | | | | | |
| Beloit | ..... | 3.20 | 23 | ..... | ..... | ..... |
| Milwaukee | ..... | ..... | ..... | 1.96 | 1 00 | 23 |

| Day. | Mean. | Max. | Min. | Range. | Dep. | Rain. | Dep. | Max. Wind. | Dir. | Mean Cloud. | Sunshine. | Dep. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 68 | 82 | 56 | 26 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 2 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 3 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 4 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 5 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 6 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 7 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 8 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 9 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 10 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 11 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 12 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 13 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 14 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 15 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 16 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 17 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 18 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 19 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 20 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 21 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 22 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 23 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 24 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 25 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 26 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 27 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 28 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 29 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 30 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |
| 31 | 68 | 84 | 56 | 28 | -1 | 0.00 | -0.07 | 20 | NW | 0.2 | 11.0 | +1.0 |

**Chart I. Tracks of Centers of High Areas. August, 1893.**

Chart II. Tracks of Centers of Low Areas. August, 1898.

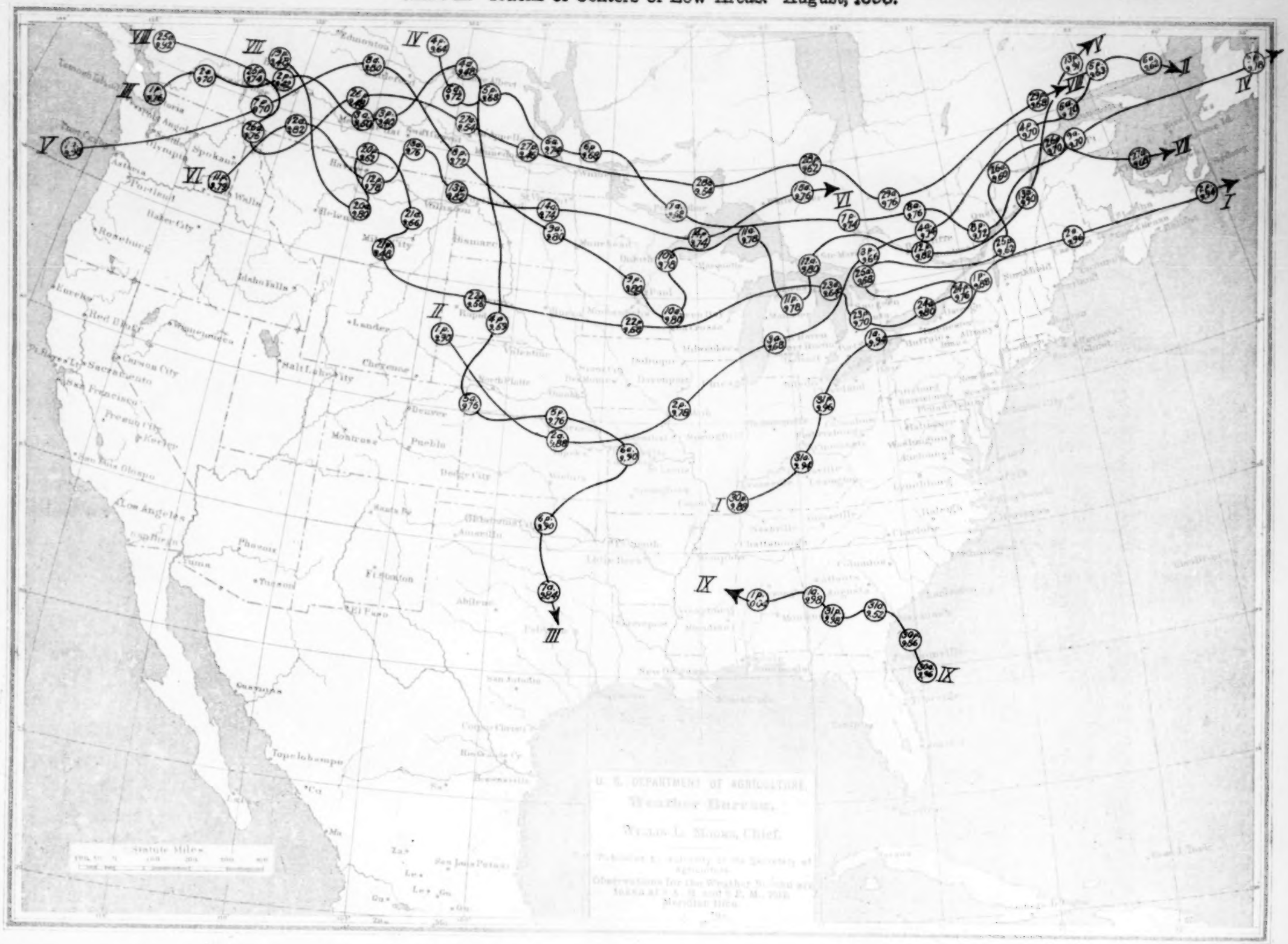



Chart III. Total Precipitation. August, 1898.

## Chart III. Total Precipitation. August, 1898.

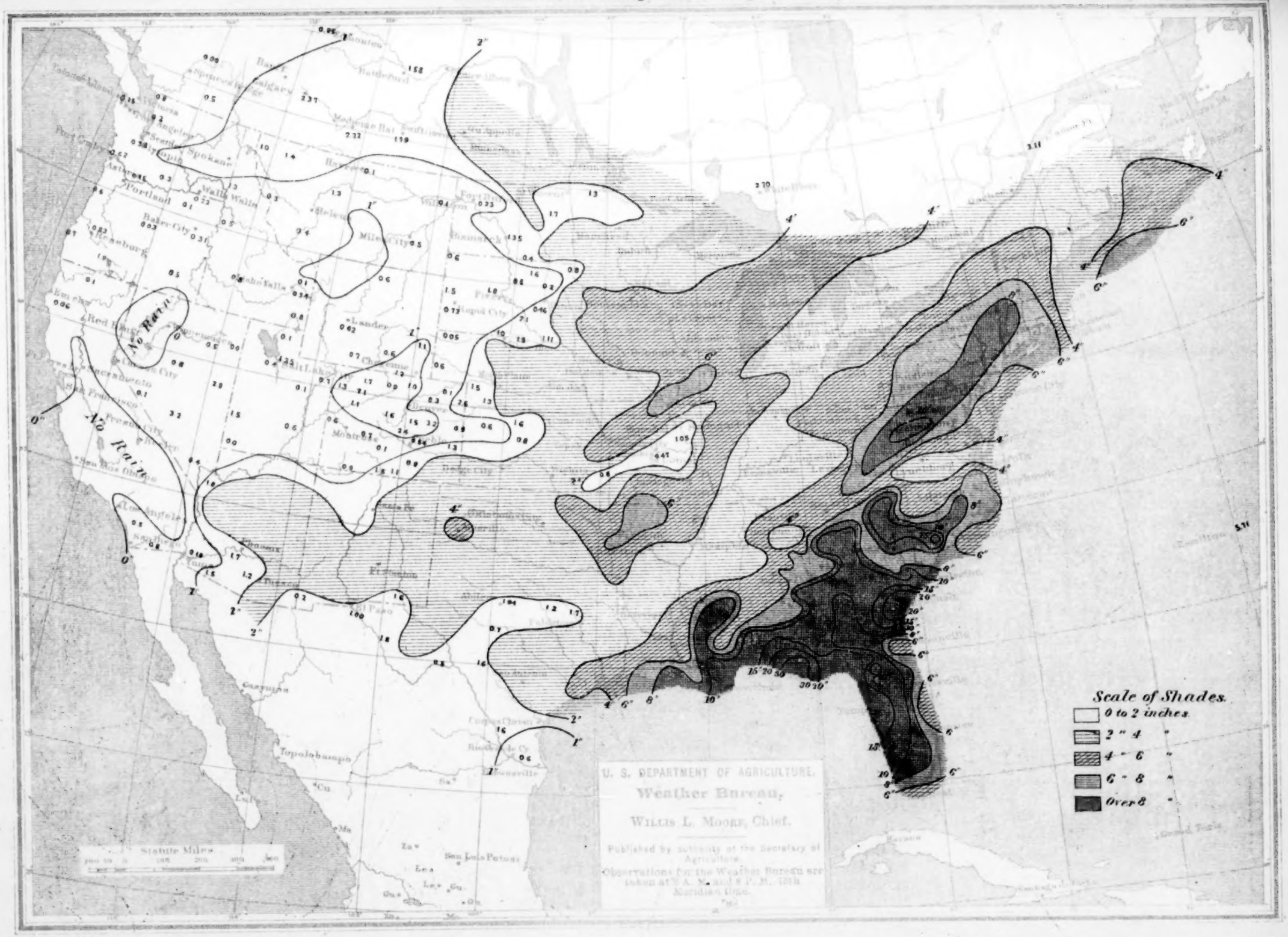
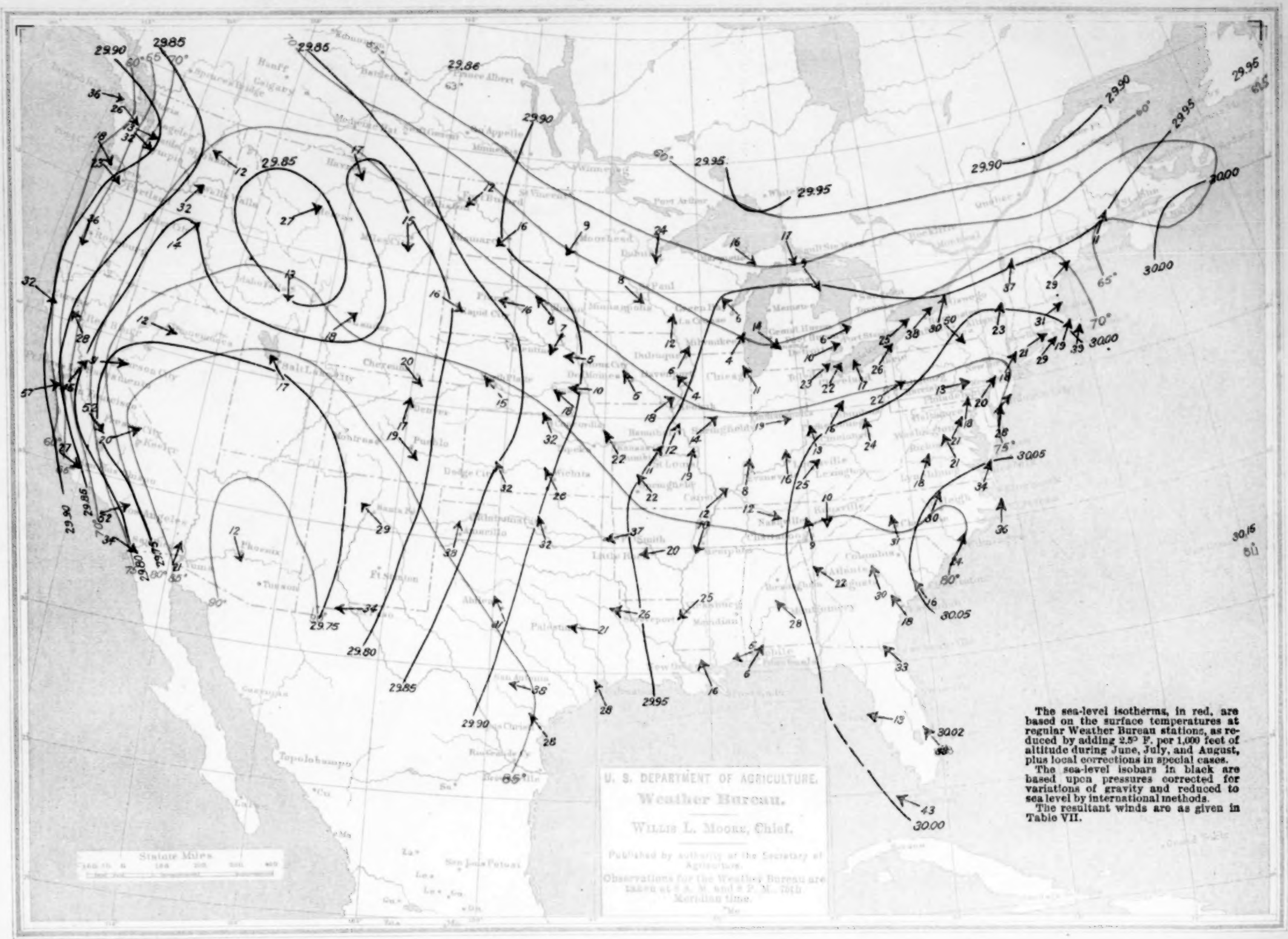

No Rain
No Rain
Scale of Shades.
0 to 2 inches.
2 " 4 "
4 " 6 "
6 " 8 "
Over 8 "
Statute Miles
U. S. DEPARTMENT OF AGRICULTURE.
Weather Bureau.
WILLIS L. MOORE, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 7 A. M. and 8 P. M. 90th Meridian time.

**Chart IV. Sea-Level Pressure and Temperature and Resultant Surface Winds. August, 1898.**

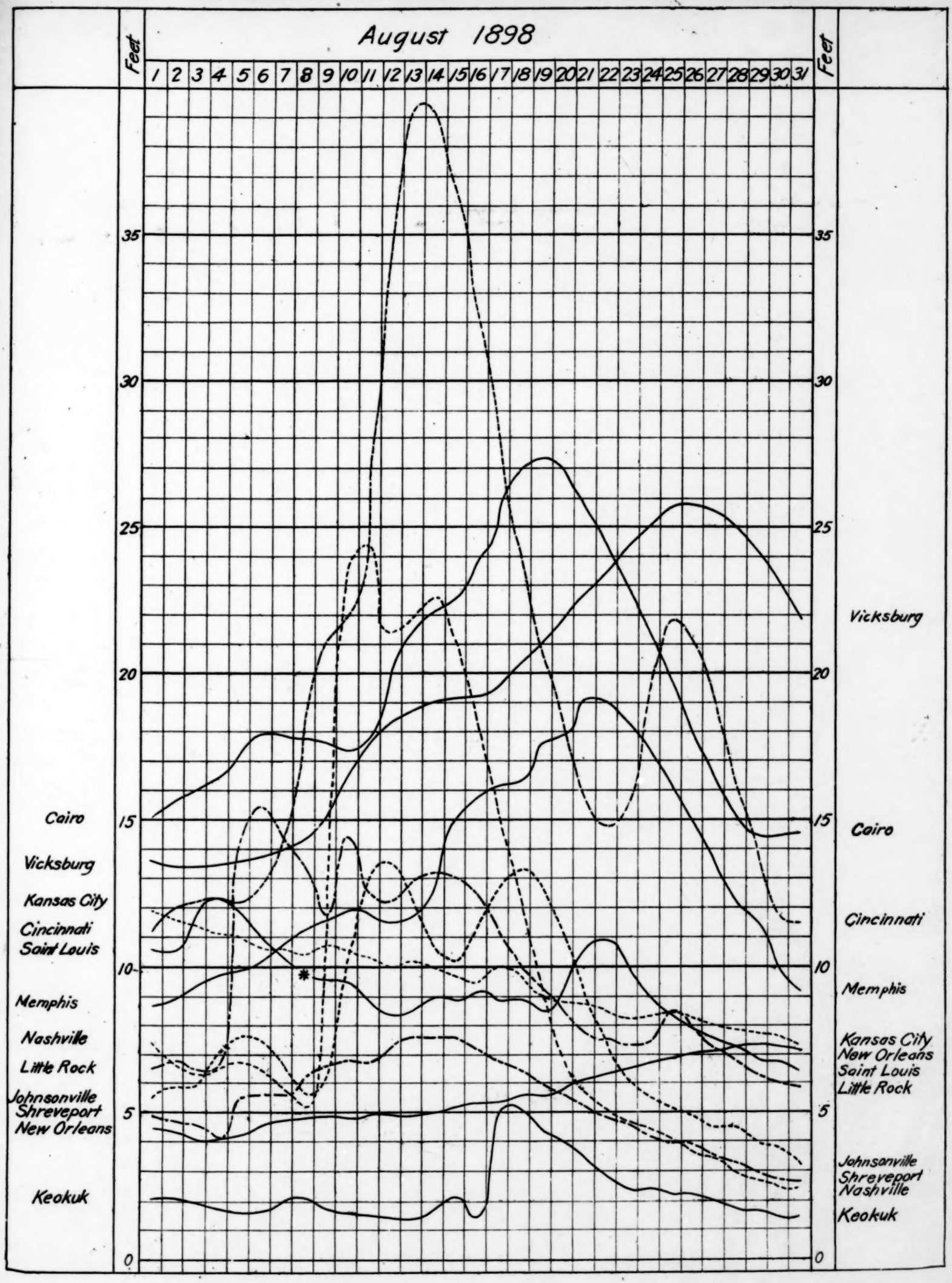



The sea-level isotherms, in red, are based on the surface temperatures at regular Weather Bureau stations, as reduced by adding 2.5° F. per 1,000 feet of altitude during June, July, and August, plus local corrections in special cases.

The sea-level isobars in black are based upon pressures corrected for variations of gravity and reduced to sea level by international methods.

The resultant winds are as given in Table VII.

**Chart V. Hydrographs for Seven Principal Rivers of the United States. August, 1898.**




* Guage Covered with mud

Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. August, 1898.

**Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. August, 1898.**

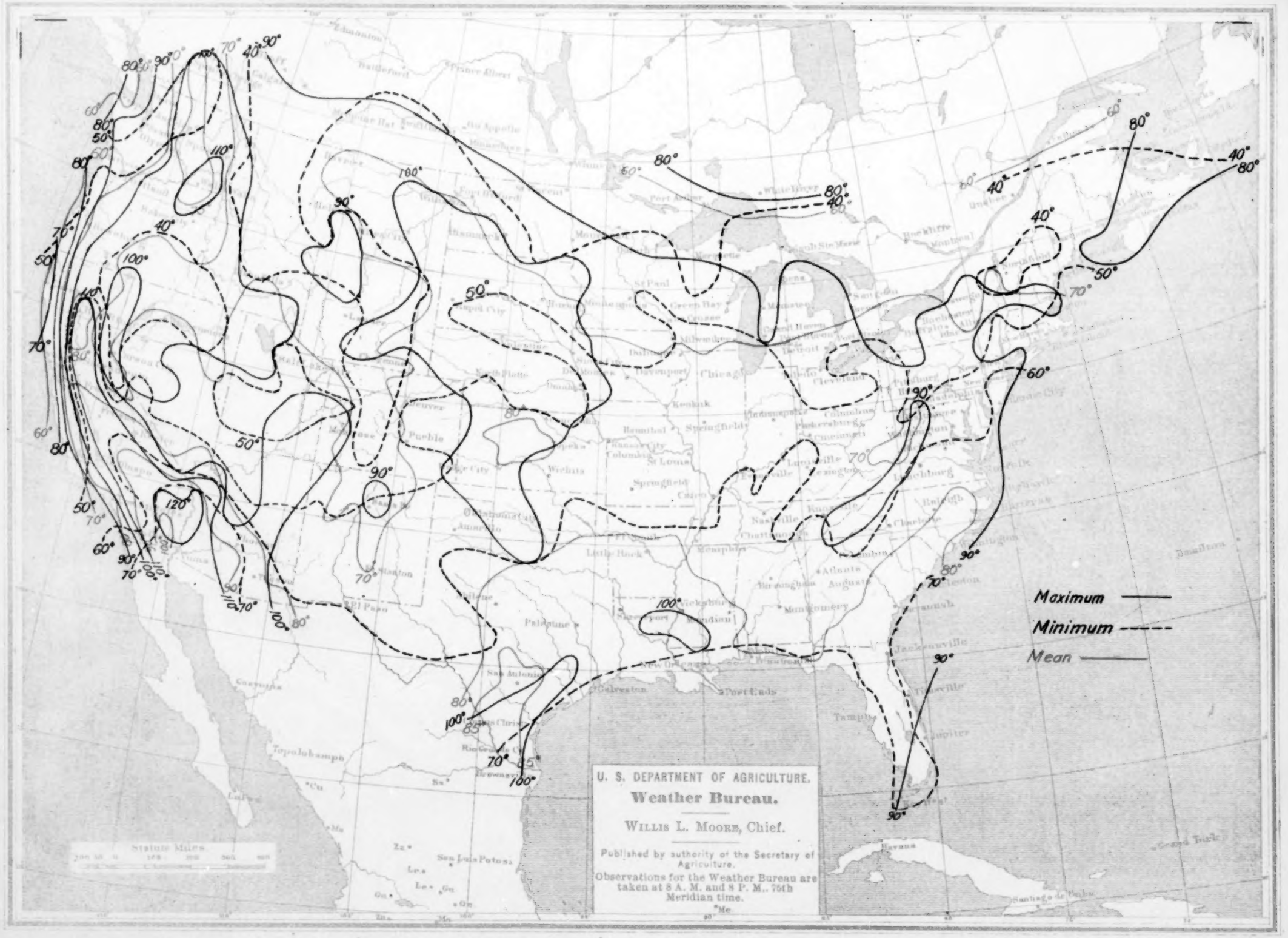

Maximum
Minimum
Mean
U. S. DEPARTMENT OF AGRICULTURE.
Weather Bureau.
WILLIS L. MOORE, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M., 75th Meridian time.
Statute Miles

Chart VII. Percentage of Sunshine. August, 1898.